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The Journal of Obstetrics and Gynæcology of the British Empire

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The Journal of Obstetrics and Gynæcology of the British Empire

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EDITORIAL.

THE Fifth British Congress of Obstetrics and Gynæcology will be held in London, at the Royal Society of Medicine, on April 22nd to 24th, 1925. Dr. Russell Andrews will preside in his capacity of President of the Section of Obstetrics and Gynæcology of the Royal Society of Medicine.

The first British Congress of Obstetrics and Gynæcology was held in London in 1920, and since then meetings have been held in Birmingham, Liverpool and Edinburgh. The British and Irish Societies associated with the Congress include the Section of Obstetrics and Gynæcology of the Royal Society of Medicine, the Midland Obstetric and Gynæcological Society, the North of England Obstetrical and Gynæcological Society, the Edinburgh Obstetrical and Gynæcological Society, the Glasgow Obstetrical and Gynæcological Society, and the Section of Obstetrics and Gynæcology of the Royal Academy of Medicine of Dublin.

The proceedings will include a set discussion on the "Diagnosis and Treatment of Puerperal Sepsis," which is expected to occupy one whole day of two sessions. This discussion should prove to be of great interest, since it will be introduced by Reports upon which special Committees in London, the Midlands, and in the North of England have been working for over a year. Other sessions will be devoted to the reading of individual communications, and to epidiascopic demonstrations on histological subjects. In addition a preliminary report on Eclampsia will be communicated from the special Eclampsia Committee, and there will be an exhibition of Pathological Specimens, of which a catalogue will be prepared. Operative demonstrations will also be given at the various hospitals by their respective Gynæcological Surgeons.

Any medical practitioner wishing to read a paper at the Congress should inform one of the Honorary Secretaries before December 31st, and the paper itself should be sent in by the 28th of February, 1925. It is hoped to publish in advance a short extract of each paper accepted by the Congress Committee. All communications respecting papers

should be addressed to one of the Honorary Secretaries, Mr. Clifford White, 62, Harley Street, W. 1, or Dr. J. D. Barris, 50, Welbeck Street, W. 1, and those relating to the exhibition of Pathological Specimens to the Honorary Secretary of the Pathology Sub-Committee, Dr. Everard Williams, 5, Wimpole Street, W. 1.

The London Members of the Congress will entertain the visiting members at Lunch on April 22nd, and the President will hold a Reception in the Rooms of the Royal Society of Medicine the same evening. On the evening of April 23rd the Members of the Congress and their guests will dine together.

The membership of the Congress is not limited to the members of those Societies indicated above, and any medical practitioner interested in Obstetrics or Gynæcology will be welcomed at the Congress.

The Etiology, Classification and Life History of Tumours of the Ovary and other Female Pelvic Organs containing Aberrant Müllerian Elements, with suggested Nomenclature.

By K. Vernon Bailey, *M.C.*, M.D., Ch.B. (Manchester),
Resident Obstetric Surgeon, St. Mary's Hospital, Manchester.

Historical Note.

This work deals with that tumour of the female pelvis known as "adenomyoma," but only in its extra-uterine pelvic situations, or when in the uterine body, having no connexion with the uterine mucosa. Many authors have described the occurrence of this tumour in various situations of the body, from the pelvis to the umbilicus, notably Cullen and Sampson, and the diffuse uterine "adenomyoma," the mucosal origin of which was clearly demonstrated by Cullen in 1896, is a condition so well investigated as to leave its pathology in no doubt whatsoever.

I have, therefore, not included this type of the tumour in my work and will not go into the now very extensive literature relating to it.

Tumours of the same class—in that they contain tissue of endometrial or Fallopian tube type—located in the various pelvic organs outside the uterus itself, or if in the uterine body, having no connexion with the uterine mucosa, are a definite and distinct type, especially varying, as they do, in their etiology from the diffuse uterine "adenomyoma." I therefore believe that in describing the condition of the female pelvis brought about by the presence of these tumours, I am dealing with a definite pathological entity.

Space is too short to discuss fully the very interesting literature relating to this condition. I must content myself with briefly indicating the chief authors and their views.

Until the recent work of Sampson, relatively few cases had been described or those that had were not recognized as this particular condition at the time. Iwanoff's serosal theory relating to subperitoneal uterine tumours of this type which appeared about the end of the nineteenth century was amongst the earliest efforts to recognize a condition then thought to be distinct from the diffuse uterine tumour described by von Recklinghausen and Cullen, and Russell in 1899 was one of the earliest writers to describe this

tumour affecting the ovary. During the twenty years following this time few examples only were reported of this extra-uterine growth except when it involved the tissues of the pouch of Douglas or recto-genital space.

The question of the etiology of this tumour remains in doubt. No attempt has yet been made to classify it from a pathological and etiological standpoint, and there are many points in the pathology of its life history which are as yet not definitely explained. These are the main points which I have borne in mind and those which I wish chiefly to emphasize in my description. For example, there are many cases of "adenomyoma of the recto-vaginal septum" described by various authors. Lockyer gives a summary of over forty cases in "Fibroids and Allied Tumours" (1917).

In my classification of this tumour as a whole, however, the growth between rectum and cervix forms only a part of the various tumour formations in the pelvis, and no very important point as to its etiology, classification or life history hangs on a tumour formation at this particular site. From the study of my cases, I believe that it is from the tumour in the ovary and the associated histology of the uterus and Fallopian tube that one is able to demonstrate these points, and that the tumour as it appears elsewhere in the pelvis is not of great assistance in this respect.

The work of von Recklinghausen,[1] though of paramount importance, inasmuch as full interest in the subject of "adenomyoma" of the female pelvic organs was first aroused by the publication of it, is not concerned with this extra-uterine type of growth. The evolution of his famous Wolffian theory as to the etiology of these growths was based upon the study of "adenomyomata" of the diffuse type and those situated in the uterine musculature in the vicinity of the interstitial portion of the Fallopian tube—"cornual adenomyomata," the pathology of which has been made clear by the work of Chiari, Martin, Orthmann, Werth, Schauta and others, and in consequence has been variously termed "salpingitis isthmica nodosa," "adenomyositis tubæ," or "adenomyo-salpingitis of Rabbinovitz."

The early work of Cullen[2] in 1894-6 was from similar material, and the formation of his mucosal theory in relation to the etiology came as a result. This etiological theory was in direct conflict, at the time, with the serosal theory of Iwanoff,[3] which was published about 1898 and which later gained the support of Pick, Aschoff, Robert Meyer and others. Meyer[4] later upheld this theory, and attributed the process to a primary inflammation with secondary epithelial heterotopy or displacement, and to this day it is thought by many that "adenomyomatous" tumours situated near the serous surface of the uterus and also many extra-uterine tumours,

notably those in the recto-genital space, owe their gland elements to serosal inclusion. R. Klages[5] demonstrated a case which supported this theory. Meyer, Bazy and Semmelink and Josselin de Jong[6] report cases in which the uterine serosa appears to have formed a definite mucous membrane resembling that of the uterine cavity.

This serosal theory held good until quite recently for all known extra-uterine "adenomyomata" and also the sub-peritoneal variety, although Cullen stuck to his view that extra-uterine "adenomyomata" derive their adenomatous tissue from congenital Müllerian relics, and as regards the sub-peritoneal growth, that they were primarily derived from the glands of the uterine mucosa.

W. W. Russell,[7] in 1899, described the appearance of small areas of endometrium-like tissue in an ovary.

The most important theories as to the etiology of epithelial elements in the ovary at this time were: (1) Anomalies of growth of germinal epithelium, advocated chiefly by Waldeyer,[8] Marchand[9] and Williams[10]; (2) Graafian follicle—Frommel[11] in 1890 and Williams in 1890 attempted to demonstrate the origin of epithelial elements in the ovary from the membrana granulosa; (3) Wolffian body; (4) Müller's duct—Nagel[12] and Waldeyer called attention to the groove in the germinal epithelium which later becomes the Müllerian duct.

Russell therefore explained the condition as demonstrated in his specimen as due to an anomalous point of development of portions of the Müllerian duct in the germinal epithelium.

Cuthbert Lockyer,[13] in 1917, classified "adenomyomata" into (*a*) uterine and (*b*) extra-uterine, and describes a number of cases. His description of "adenomyoma" of the Fallopian tube, however, is that of the "salpingitis isthmica nodosa" of Chiari (cf. Case XVI). He quotes Jacobs' case[14] of this type, and leans to Fränkl's[15] view of the mesonephric origin of these growths affecting the round ligament. With regard to the source of the epithelium in "adenomyomata" of the recto-genital space, Lockyer says: "The prevailing view at the present time . . . . . is to regard adenomyoma of the recto-genital space as an inflammatory product and not a true neoplasm."[16]

De Witt B. Casler[17] and Morris[18] published cases in 1920 showing the presence of endometrium-like tissue in an ovary, and Cullen[19] in the same year reported cases which demonstrated the presence of uterine mucosa in many extra-uterine situations, but does not discuss the etiology of these tumours from his pathological findings.

Sampson[20] in 1921 revolutionized all pre-existing theories as to the etiology of pelvic growths of "adenomyomatous" nature by

pointing out their obvious relationship to the so-called "chocolate cysts" found in the ovaries, and described the gross and histological appearance of this ovarian condition. His work, which is well known, undoubtedly set the pathology of this pelvic condition on a sound basis. He mentions the work of Runge,[21] Wolf[22] and Hedley,[23] and as a result of his extensive research concludes that this pelvic condition is analogous to the implantation of papilloma or cancer on the peritoneal surface of the pelvis from the rupture of an ovarian tumour containing these growths.

Blair Bell[24] reports a case in which he demonstrates the presence of endometrium-like tissue in both ovaries associated with a normal uterus and normal Fallopian tubes. He suggests the nomenclature of "endometrioma" for the condition. Shaw and Addis[25] also report a case of advanced "tarry cysts" in both ovaries. Donald[26] in 1922 read a communication at a meeting of the North of England Obstetrical and Gynæcological Society, in which he stated his belief, on purely clinical grounds, that "chocolate cysts" of the ovary so often found in conjunction with "adenomyoma" of the uterus might be due to the same condition in the ovary itself. He later[27] reported five additional cases in the "Journal of Obstetrics and Gynæcology." The total of ten cases thus reported were operated upon by him in the first half of 1922. He discusses at length the clinical aspect of this condition and lays great emphasis on the symptom of acquired pre-menstrual dysmenorrhœa.

In a more recent work Sampson[28] comes to regard the ovary in this condition as "a sort of intermediary host, hot-bed or incubator which sometimes imparts greater virulence to the epithelial cells developing in it . . . . . in the origin of implantation adenomas of endometrial type." He classifies "ovarian hæmatomata" into two varieties: (1) superficial and (2) deep; the main histological feature about each being the presence—either in the superficial or deep tissues of the ovary—of a dilated space lined by columnar epithelium of endometrial type. His description differs greatly from the life history of the tumour as I have observed it histologically. I find no evidence of the continued growth of a single dilated gland space, either superficially or deeply placed in the ovary. I believe that the large cavities in the ovary are formed by the gradual eating away of the ovarian tissue by the invading endometrium—as a cavity in an apple may be formed by the invasion of insects living on its substance.

SUMMARY.

The history of this tumour, which is generally known as "adenomyoma," but which Sampson latterly refers to as "'adenoma," is included in the last thirty years of the pathology

of the female pelvis. During this time many attempts have been made to elucidate its pathology, and to arrive at its etiology.

Classifications have always been made from the anatomical point of view, chiefly because the relation between the growths in different situations was not realized, and the vast majority of theories as to etiology have been based upon anatomical relationships of structures during development and "metaplasia."

It is due to Sampson of Albany, U.S.A., that the pathology of the condition has recently begun to be understood, and to Donald of Manchester that its clinical aspects are beginning to be realized.

I think, however, that the pathology is not yet complete and hope that assistance in this respect may be gained as the result of this work.

Classification.

From the study of my 20 cases it can be seen that the whole pathological condition of the pelvis in any one case, can be divided into two distinct types from the etiological and pathological standpoint, viz. :—(1) Endometrial type; (2) Fallopian tube type.

These two types can be differentiated from differences in the gross appearance of the lesions produced and—more definitely—from differences in the histology of the various tumour formations.

The endometrial type appears to predominate. My cases show 16 to be of this type and 4 to belong to the Fallopian tube type.

Both types, however, may create widespread lesions throughout the pelvis and many tumours may occur on the various pelvic organs in consequence of the growth in these abnormal situations of either endometrial or Fallopian epithelium. In any one case the majority of the pelvic organs may be invaded in greater or less degree by aberrant epithelial elements of either of these two types, possibly bringing about a mass of pelvic adhesions as an end-result. The various pelvic organs may react somewhat differently to invasion by epithelium of these types, but histologically it can be seen that they are all affected in the same way and therefore that the general appearance of the pelvis, however many structures may be involved, is brought about by one definite pathological process and must therefore be looked upon as produced by one tumour. The organ into which misplaced epithelium of this nature appears to be able to eat its way and establish itself with greatest ease is the ovary. It is the ovary which exhibits the results of the growth and activity of this tissue to the fullest extent. Other pelvic structures, such as the uterine body or the various ligaments, may be affected in the same case, and it can be seen that the misplaced endometrial or Fallopian tissue invading them is of old standing, but it is obvious that this tissue cannot produce the effect in muscle that it

can in the ovarian stroma. A relatively insignificant reaction may be the only evidence of this growth in the uterine wall when, in the same case, the ovary has been reduced to a distended sac containing dark, tarry blood, a product of the activity of the invading tissue.

It is from the ovary, therefore, that the life history of the condition can best be studied, although progressive changes can be traced from the tumour in other situations less distinctly, and it is chiefly from the appearance of this tumour as seen in affected ovaries that I have formed the above classification. In all cases, however, its appearance elsewhere corresponds accurately.

The general appearance, as seen at operation, produced by either of these types may be the same.

Extensive adhesions may exist between affected structures—chiefly between the anterior rectal wall and posterior uterine wall and between ovary and uterus. One or both ovaries may be affected and adherent to either the base of the broad ligament or the postero-lateral uterine wall, or, as chiefly in the Fallopian tube type, an affected ovary may be non-adherent. The uterus itself may occupy any position relative to the pelvic cavity. A common position for it is in the pelvic axis, but if densely adherent to the rectum behind it may be pulled back into retroversion.

The general appearance, therefore, of the pelvic organs, as revealed at operation, may be much the same as that produced by inflammation, and the diagnosis rests on the examination of the gross appearance of the various organs after removal and on histological evidence.

The salient features in regard to the *gross pathology* of the ovary and other organs affected by the *endometrial type* of this tumour are as follows:—

(1) The affected ovary exhibits either a diffuse hæmorrhagic area on its surface, of varying size but usually not larger than 2 mm. in diameter, *or*

(2) actual erosion of the ovarian surface which is of a dark hæmorrhagic nature may be present, *or*

(3) much more commonly the ovary is seen to be "eaten into" by thick, fluid, chocolate-coloured blood which may be observed to have "penetrated" only superficially or may exist in any stage up to the transformation of the ovary into a distended sac containing this fluid, the walls of which are formed by the compressed and thinned-out ovarian stroma itself. This "chocolate fluid" in the early stages marks the progress and situation of the endometrial tissue in the ovary, being produced by it as the result of its own activity.

(4) The lesions produced in the ovaries, uterine wall, pelvic ligaments, rectum, etc., are obviously of an active local invasive

nature. The impression of great activity on the part of the abnormally placed tissue is produced. Excavation may be extensive.

(5) The pelvic adhesions are of a very dense character. The ovaries are fastened to the uterine wall or broad ligament by actual new growth in many instances and are often very difficult to detach.

Microscopically.

(i) The abnormally placed glandular tissue is typical of true endometrium—the gland spaces being indistinguishable from those found in normal endometrium and situated in the highly cellular endometrial stroma—distinguishing this type definitely from the histological appearance of the Fallopian tube type.

(ii) The endometrial tissue is very invasive. In many cases it has penetrated deeply into the ovarian stroma and eventually cavity formation is brought about.

On the other hand the *Fallopian tube type* of this condition exhibits its own gross pathological features and histology.

Macroscopically.

(i) It is evidenced by small scattered hæmorrhages on the ovarian surface of varying colour from bright red to almost black according to their age; advanced conditions exhibit erosion of the ovarian surface. A small depressed scar may mark the site of an old deposit.

(ii) This type is characterized by the relatively light nature of the pelvic adhesions, differing markedly from the dense character of those produced in the endometrial type.

(iii) Blood cavities in the ovary are not produced.

(iv) Both macroscopically and microscopically there is the appearance of only slight invasiveness on the part of the misplaced tissue, which only penetrates at most to a depth of about 2 mm. below the surface of the organ in which it is growing.

Microscopically.

(i) The nature of the gland-spaces is atypical—they are large, often single, dilated and atypically shaped, lying directly on the ovarian stroma with no supporting endometrial stroma and very little rarefaction of surrounding tissues. These features differentiate the Fallopian tube type definitely from the endometrial type.

(ii) The gland spaces are lined by high columnar, ciliated epithelium.

(iii) These gland spaces are situated near the ovarian surface and do not tend to invade its stroma deeply.

(iv) The high, narrow, ciliated type of cell lining the gland-spaces, with its concave sides and relatively broad surface " dusted over " by debris, is very different from the orderly arranged, " clean " columnar epithelium lining the glands in the endometrial type.

These are the main points which characterize the two types of this condition and which make the differentiation between the two quite definite. Although, etiologically and pathologically these two types belong to the same pathological entity, they nevertheless possess such distinctive properties that each must be studied separately, and I now wish to describe the life-history of each, from its commencement as a tumour, to the point where it has reached the termination of its activities. This is based upon the study of 27 cases, 20 of which I am able to report in the text. Of these 20, 16 are of the endometrial type and 4 of the Fallopian tube type. Figs. *A* and *B*.

GENERAL DESCRIPTION.

The Life History of the Endometrial Type.

I have previously stated that this pathological condition of the female pelvis may, at the one time, be found to affect more than one of the pelvic organs. One or both ovaries, uterine body, pelvic ligaments and various peritoneal surfaces may all, at the same time, be the site of tumours of this nature. It is, however, in the ovary that we can trace its origin and life-history to the best advantage, although other affected organs lend additional evidence and agree accurately with the main characteristics as found in the ovary.

In describing the life-history of this type, therefore, I shall do so mainly from evidence of it as found in the ovary, and as far as possible also as found in other pelvic organs.

I have numbered the various cases according to the relative age of the condition as found in them, and not according to the time at which they were acquired and studied. In this way the life-history can more easily be understood from a survey of the description of the individual cases which follow, and references to them will be made accordingly in the text.

A. Endometrial invasion as it affects the ovary.

Stage I. The very earliest stage, that is, a primary deposition of endometrium on the surface of the ovary is not a condition visible to the naked eye. I have found it, however, by studying serial sections cut through an ovary which exhibited early naked-eye appearances of the tumour.

Case I of my series shows, microscopically, two small gland spaces, typical of the endometrium, lined by columnar epithelium and partially surrounded by a very fine fibrin matrix which contains a few clumps of cells indistinguishable from endometrial stroma cells, situated on the surface of the right ovary. These endometrial gland spaces have been deposited, as such in this case, upon the ovarian surface, and the appearance here represents the earliest possible stage of the endometrial type of this tumour. As yet there is no invasion of the ovarian stroma on the part of this tissue. Fig. 1.

It is also evident that the epithelial elements have no connexion whatever with ovarian germinal epithelium. The gland-spaces are entirely discrete and have the appearance—as I believe is the case—of having been deposited upon the surface of the ovary from without. I do not think that the earliest manifestation of this condition is always as typical as this. Possibly in many cases a few detached endometrial lining cells alone are deposited on the surface of an ovary. Such would be sufficient to act as a starting point for endometrial activity with consequent tumour formation. However, in this case, a very typical appearance is represented and one, I think, which places beyond all doubt the question of the nature of commencement of this tumour and provides strong evidence in support of the origin of the epithelial elements from without.

The left ovary in Case III also shows this very early condition. In this case the ovary was hard and difficult to cut. The sections were not good and the appearance was not clearly defined. A clump of typical endometrial tissue can, however, be observed implanted upon the ovarian surface. Two gland-spaces are present, the epithelium of which stained faintly and photographed badly. Fig. 2.

Stage II. The next stage is that of invasion of the ovarian stroma by the abnormally placed endometrium. The naked-eye appearance varies according to the mode of invasion. If the primary endometrial deposit occupies a relatively wide area on the ovarian surface and invasion takes place over the whole of this area, a minute excavation results in the periphery of the ovary. This contains dark blood, but not chocolate-coloured, as there is no long retention of it in the depths of the ovarian tissues.

The right ovary in Case II shows this stage very well. A deposition of typical endometrial glands and stroma is beginning to invade the ovary and has penetrated to a depth of about 1 mm. A small excavation is thus formed into which the endometrial tissue continues to grow. Figs. 3 and 4.

If, on the other hand, the area of invasion from without by the endometrium be relatively small, the invading tissue will undermine

the surface of the ovary by its activity and grow at the expense of the stroma immediately beneath the surface. The endometrial tissue menstruates concurrently with the uterine endometrium and a small space filled with this menstrual blood is formed immediately beneath the ovarian surface and is recognized by the naked eye as a somewhat diffuse hæmorrhagic bleb on the surface.

The left ovary of Case III shows this appearance and the production of a small space containing blood produced by the menstrual activity of the invading glands and stroma below the surface of the ovary. In this case menstruation was in progress at the time the pelvic organs were removed, and it can be seen here that this abnormally situated endometrial tissue is actively menstruating. Figs. 5 and 6. The typical nature of the endometrial tissue is visible under the low power. Another example of this stage is also seen in the right ovary of Case VIII, a small cyst-like space having been formed immediately beneath the surface of the ovary on its free border by the invasive endometrium and being visible to the naked eye as a hæmorrhagic bleb or spot. Figs. 7 and 8.

Stage III. From this stage the invading endometrium gradually penetrates further into the tissues of the ovary, and the glands and stroma increase in number and quantity as it does so, until a definite stage is reached in which the invading endometrium has formed itself into a wedge with its broad base to the ovarian surface and its point formed by a mass of typical endometrial stroma cells in advance of the actual glandular elements pushing their way further into the ovarian stroma. By this time menstruation has occurred probably more than once in this endometrial tissue and varying degrees of hæmorrhagic infiltration of the stroma cells are apparent in different cases. The pent-up menstrual blood is extravasated into the surrounding stroma cells which in consequence lose their typical appearance when this infiltration is great, and become relatively widely separated and spindle-shaped, the whole giving the appearance of a loose spindle-celled matrix. It is quite easy, however, to trace the connexion between this type of supporting stroma and the typical round-cell stroma in many of the cases, the one gradually transforming itself into the other as it passes into an area free from hæmorrhagic infiltration.

The right ovary of Case III shows the wedge-shaped formation of the invading endometrium which in this case is actively menstruating. Fig. 9.

At this time the affected ovary has been penetrated to a depth of about 5 mm. and usually over an area of from 2—8 mm. This stage is recognized, macroscopically, by an erosion of the ovarian surface with excavation to about the above depth, the whole area

being hæmorrhagic and the associated blood dark in colour but not yet chocolate-coloured. The affected area is always adherent to some other pelvic organ, usually the base of the broad ligament or the uterine body.

The right ovary of Case IV also shows this stage and the appearance of the endometrial stroma due to hæmorrhagic infiltration. Fig. 10.

Occasionally the endometrium may invade the ovary so rapidly that its course is represented by a narrow channel of glandular and stromal tissue which widens out at the point of furthermost penetration where the actively invading endometrial tissue is situated.

This condition is well represented in the right ovary of Case I in which a narrow channel with typical endometrium attached to its sides can be seen branching into two and terminating in two clumps of endometrial tissue. Figs. 11, 12 and 13.

In whatever way the endometrium may invade the ovary, however, and my cases show the wedge-shaped formation to be the most frequent, this particular stage in the life-history of the condition is recognized by the fact that the endometrial tissue is in a state of great activity. In this stage it is at the height of its activity. Masses of glands and stroma cells are present, the latter actively penetrating the ovarian tissues in advance of the former. If the time of removal corresponds to the menstrual period of the patient, the abnormally placed endometrium is seen to be also actively menstruating (cf. Case 3).

There is, in this stage, no evidence of long retained menstrual blood—the chocolate-coloured fluid described by many authors. If the invading endometrium has menstruated, the products of this menstruation have not been retained long enough for this change in them to take place. To the naked eye, then, the blood found in association with the deeply eroded or slightly excavated area, is of a dark red colour. Sampson intimates that it is not to be expected that abnormally placed endometrial tissue, such as is observed in the ovary, should compare favourably, on morphological grounds, with the true endometrium of the uterine cavity. He asserts that a comparison should rather be made between it and endometrial gland spaces as found in conditions of diffuse adenomyoma of the uterine body " as here the conditions under which these tissues are growing are the same." In this stage, however, I can show that the abnormally situated endometrium is identical with true endometrium (Figs. 7 and 10). In many of my cases photographs of true endometrium of the uterine cavity and abnormally placed endometrial tissue are taken in the same case; there is no difference between the two morphologically (cf. Figs. 9 and 63).

Stage IV. From this point onwards the invading endometrium

gradually loses its activity but does not finally do so until it has transformed the ovary into a distended sac containing old menstrual blood.

The next stage is visible to the naked eye, on section of the ovary in the direction of the growth of the endometrium, as a "seam" of chocolate-coloured blood running down from the ovarian surface into the ovary itself.

The right ovary of Case IX exhibits this stage. No real cavity formation is as yet brought about, but the track of the invading endometrium is apparent from the long retention of the products of its activity. Fig. 14.

The right ovary of Case VIII also shows this stage. A thin "seam" of chocolate-coloured fluid blood runs upwards from the lower surface for about half an inch. There is no cavity formed, however, as yet. Fig. 15.

Microscopically, endometrial glands and stroma, typical in appearance but showing definite signs of early degeneration, can always be found in close association with the deepest portion of this chocolate "seam," which is itself composed of masses of broken down blood cells, blood pigment, degenerating epithelial elements and large phagocytic cells—the long-retained products of the menstrual activity of the associated endometrial tissue. It is always in the deepest parts of the invaded area that endometrial remains are found after degeneration of them has been in progress for some time, for it is at the point of furthest penetration of this tissue, during its period of great activity (Stage III), that proliferation of the glands and stroma cells takes place. This is the most active zone, and here are situated the youngest and most "virulent" of the invading elements. Their existence at this point, therefore, continues long after the majority have disappeared as the result of degeneration and absorption by the surrounding blood elements and phagocytic cells. It is a fact, however, that the endometrial glands and stroma here found are always immediately surrounded by blood of obviously newer production than that which composes the chocolate fluid "seam." This is the blood more recently extravasated by their menstrual activity, a process which continues until degeneration is complete.

The microscopical appearance of the deepest part of the chocolate "seam" in Cases VIII and IX exemplifies these facts. Figs. 16 and 17.

Stage V. As the remains of the abnormally situated endometrium gradually further invade the ovarian stroma, and, as a result of its periodic menstrual activity, more blood is extravasated into the surrounding tissues, the amount of chocolate fluid blood becomes so great that further distension of the ovarian tissue takes place

and the beginning of actual cavity formation in the ovary is brought about.

The naked-eye appearance of this stage is recognized by the extent to which the ovary is affected. The mouth of the cavity on the ovarian surface may be relatively small—usually from 2 mm. to 10 mm. in diameter—but excavation of the ovarian stroma has taken place to such a degree that the chocolate "seam" of the previous stage is now transformed into a sac-like cavity filled with chocolate fluid blood. The commencement of actual cavity formation in the ovary is seen in the right ovary of Case X which, on section in the direction of endometrial invasion, exhibits the appearance of this stage. (Fig. 18.) The increased excavation which brings about this commencing "distension" of the ovarian stroma with the formation of a blood cavity, may originate at any part of the chocolate "seam." In Case X the deeper area is seen to be becoming "distended," but in the ovary of Case XI, which also shows this stage, the chief "distension" is nearer the ovarian surface, and on cross section of the ovary it is seen that the deeper area of invasion exhibits no actual cavity formation as yet but is still in Stage IV (Figs. 19 and 20). Further excavation, brought about by the invasive activity of endometrial tissue, may originate cavity formation at any point of a chocolate "seam," but gradually this process takes place wherever endometrial tissue is situated in relation to previously invaded areas, and a rounded cavity once formed increases in size until the last stage of the life-history of this tumour is reached.

Microscopically Stage V differs from Stage IV only slightly. The evidence of further excavation of the ovary is apparent and further degeneration of the causative endometrial tissue is usually observed, although not necessarily so, because the tumour may cease to grow at any stage as the result of degeneration and absorption of the endometrial elements which originated it. One may therefore find in a blood cavity at this stage evidences of endometrial glands and stroma cells of vitality equal to any found in Stage IV.

At the base of the cavity in the right ovary of Case X (Fig. 18) a small but typical clump of endometrial tissue can be seen, and further evidence of glandular and stromal tissue can be also detected along both sides of the cavity in its deeper aspect—Fig. 21. This abnormally placed endometrium does not exhibit, microscopically, any further degenerative change than was seen in that of Case IX (Fig. 17), and its present invasive activity is still marked, as is seen by the extent of penetration of the endometrial stroma cells into the ovarian tissue—Fig. 22. It is a cavity which might easily have gone to Stage VI.

Stage VI. The last stage in the life-history of this tumour as it affects the ovary is characterized by the transformation of the affected ovary into a distended sac or pseudo-cyst by extensive endometrial excavation. The walls of this cavity are formed by the thinned-out and compressed ovarian stroma itself. There is no "cyst wall" as such, comparable with that of a follicular cyst of the ovary. I have seen two ovaries transformed into "sacs" the size of an orange by this process, but the largest contained in the cases of my series are those of Case XV, which equalled tangerine oranges in size, the right ovary of Case XII (Fig. A), which was nearly as large, and the left ovary of Case IX, which was also this size—Fig. 23.

When this stage is reached it is extremely difficult to demonstrate the presence of endometrial tissue in the blood cavity. Serial sections cut in various directions through the deepest portions of the cavity, however, have enabled me to detect traces of this tissue in a very advanced stage of degeneration in the ovaries of Cases IX and XII—Figs. 24 and 25.

Microscopically the remains of invading endometrial tissue can be seen situated in masses of old blood and phagocytic cells and having no fresh blood in immediate connexion with them, as in Stage IV. The activity of the endometrial elements is over, both as regards invasiveness and menstruation, and degeneration and absorption of them is now in progress. Morphologically the columnar cells stain very faintly, their nuclei are disintegrated and in many instances they have become detached from their basement membranes and are lying loose and free in the surrounding blood. The contour of the gland-spaces is largely lost—rarely can a typical one be seen.

In the ovaries of Case XV no trace could be found of endometrial glands or stroma, only here and there a patch of rarefied cellular tissue attached to the wall of the blood cavity and carrying on its surface a layer of low or cuboidal epithelial cells; tissue which I believe was once the active endometrium—Fig. 26.

The wall of the cavity itself—that is the ovarian stroma—is extensively and irregularly infiltrated by blood and phagocytic cells, and deposits of hyaline fibrous tissue occupy the more superficial layers of the ovarian stroma. The cavity itself is filled with thick chocolate-coloured fluid blood, the pent-up product of the long-continued menstrual activity of the invading endometrium.

At this stage further growth of the tumour has ceased, and the termination of its life-history is reached. The time taken to reach this stage must vary in individual cases. It is impossible to form an accurate opinion on this point from the clinical history, as one cannot say at what stage the condition may give rise to symptoms.

Fig. A.

Uterus and Appendages—Posterior view. Case XII.

A typical case of the endometrial type, showing an advanced stage. The uterus is shaggy, with dense adhesions posteriorly. The right ovary is transformed into a distended sac filled with chocolate-coloured fluid blood; the thinned-out and compressed ovarian stroma forming the walls. It was densely adherent to the base of the broad ligament at the aperture of the cavity shown. The left ovary is not affected.

Fig. B.

Uterus and Appendages—Posterior view. Case XIX.

A typical case of the Fallopian type. Light adhesions on posterior surface of uterine body. The right ovary, lightly adherent, exhibits numerous haemorrhagic blebs of varying colour, from bright red to black, on its surface. The left ovary is not affected. No ovarian blood cavities.

Fig. C.

Uterus and Appendages. Case X.

A myomatous uterus combined with endometrial invasion of the right ovary. The chocolate fluid blood can be seen oozing from the ovarian surface. See Fig. 18.

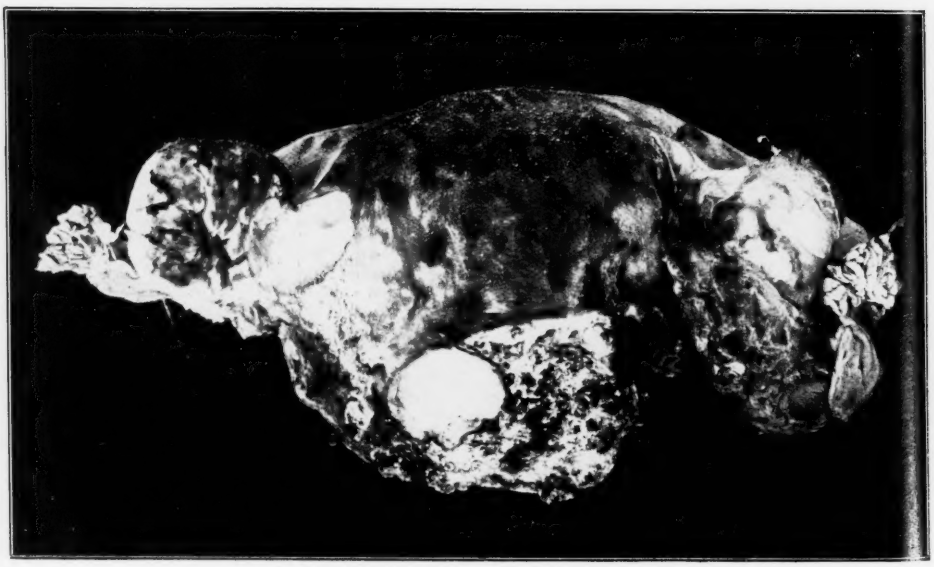

Fig. D.

Uterus and Appendages. Case XVIII.

Advanced Fallopian epithelial invasion of the right ovary. The left ovary is irregularly affected, but to a lesser degree. A hæmorrhagic bleb or spot, marking a site of the epithelial invasion, can be seen on the under surface of the left ovary.

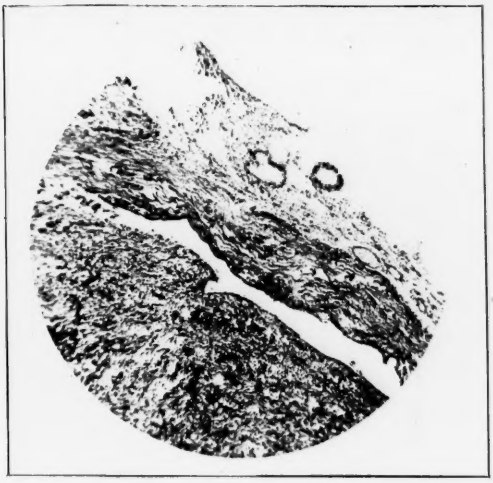

Fig. 1.

Right Ovary—Low Power—Case I.

Two small endometrial gland spaces in fine fibrin network, with scattered endometrial stroma cells situated on the surface of the right ovary. Invasion has not yet commenced.

Fig. 2.

Left Ovary—Lower Power—Case III.

Deposit of typical endometrial tissue on surface of left ovary. The earliest stage and prior to invasion.

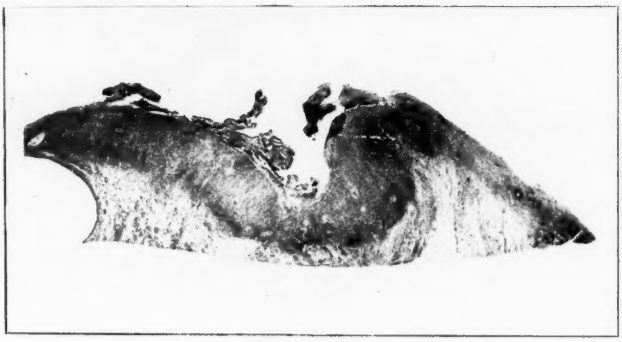

Fig. 3.

Right Ovary Case II.

Deposit of typical endometrial tissue beginning to invade ovarian stroma. The formation of a small excavation.

Fig. 4.

Right Ovary Low Power Case II.

Showing the typical nature of the endometrial glands and stroma which are beginning to invade the ovary.

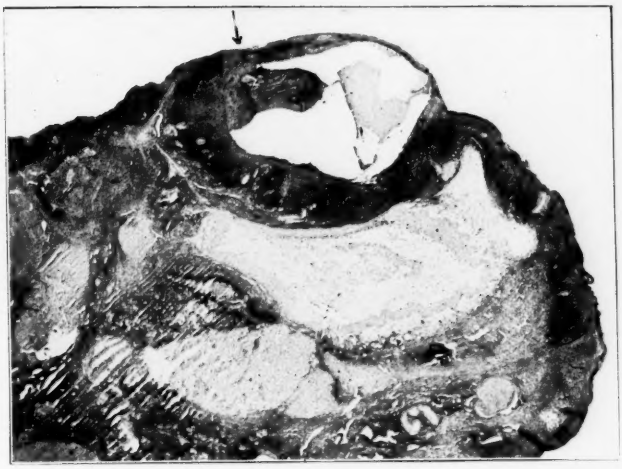

Fig. 5.
Left Ovary—Case III.
Formation of small blood space below ovarian surface by activity of invading endometrial tissue. Visible to the naked eye as hæmorrhagic bleb on surface of ovary. Endometrial tissue actively menstruating.

Fig. 6.
Left Ovary—Low Power—Case III.
Showing the typical nature of the menstruating endometrial tissue forming the hæmorrhagic bleb.

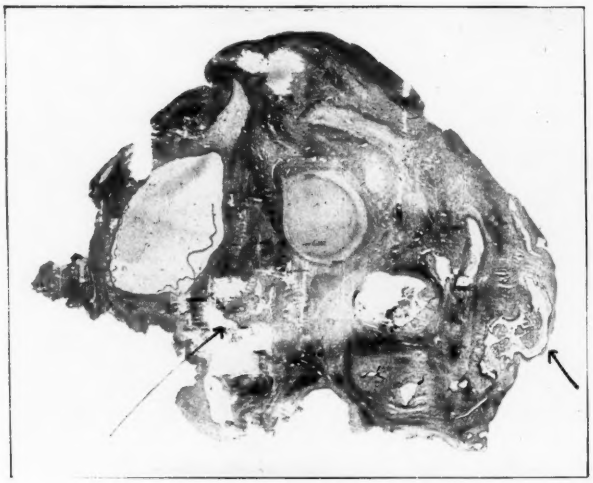

Fig. 7.

Right Ovary—Case VIII.

Small cyst-like space immediately beneath the lateral ovarian surface containing typical endometrial tissue in a menstrual phase. A further advanced stage can be seen on the under surface.

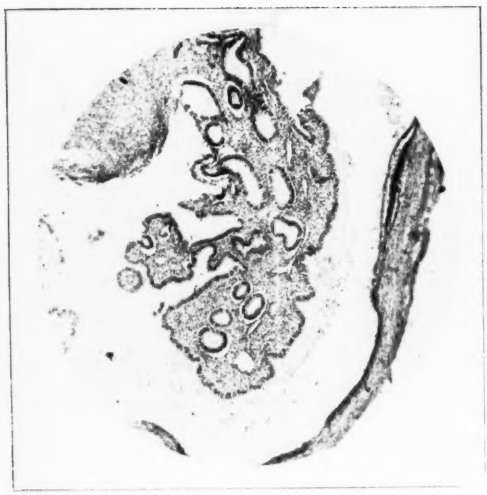

Fig. 8.

Right Ovary—Low Power—Case VIII.

Showing the typical nature of the endometrial tissue contained in this small space.

Fig. 9.

Right Ovary—Low Power—Case VI.

Wedge-shaped formation of invading endome glands and stroma actively menstruating.

Fig. 10.

Right Ovary—Low Power—Case IV.

Typical endometrial tissue invading ovary in wedge-shaped formation. Hæmorrhagic infiltration in lower portion.

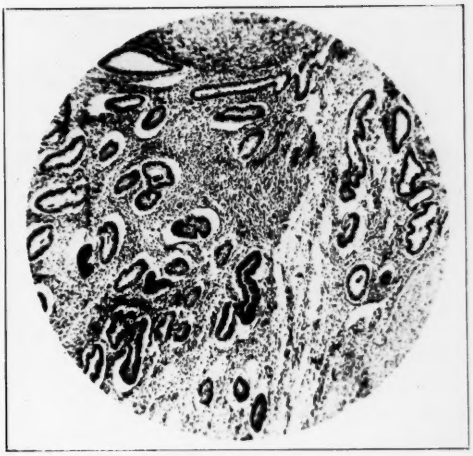

Fig. 12.

Right Ovary—Low Power—Case I.

The typical nature of the endometrial glands and stroma, showing the effect on the supporting stroma caused by the hæmorrhagic infiltration.

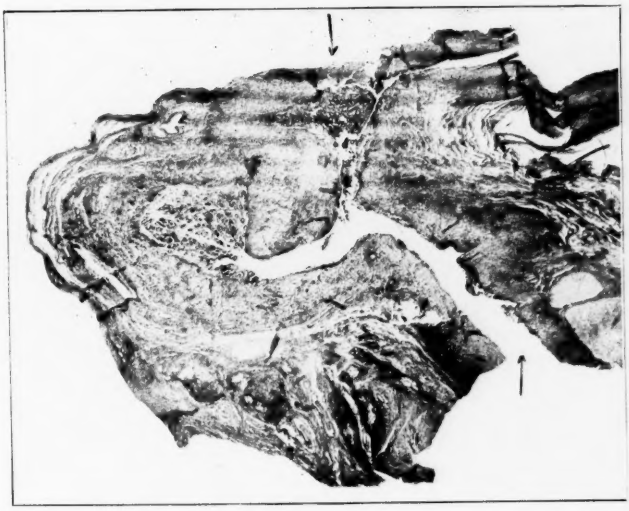

Fig. 11.

Right Ovary—Case I.

Showing narrow channel of invading endometrium, with terminating clumps of actively penetrating endometrium.

Fig. 13.
Right Ovary—Low Power—Case I.
The typical nature of the endometrial tissue attached along the sides of the narrow channel of invasion.

Fig. 14.
Right Ovary—Case IX.
Transverse section in the direction of the line of growth, showing " seam " of chocolate-coloured blood entering the ovarian stroma. No cavity formation.

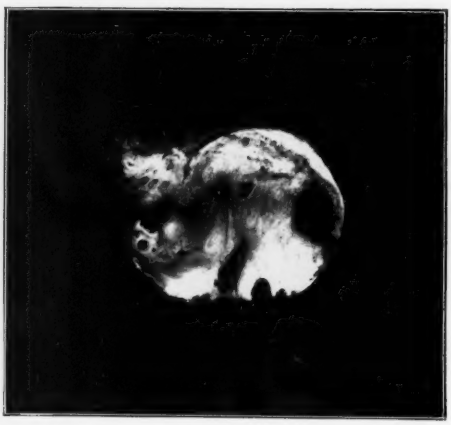

Fig. 15.
Right Ovary—Case VIII.
Transverse section through right ovary. A thin " seam " of chocolate-coloured blood extends from the lower surface into the ovary.

Fig. 16.
Right Ovary—Low Power—Case VIII.
Degenerating endometrial tissue in connection with the deepest portion of the chocolate " seam " shown in Fig. 15.

Fig. 17.

Right Ovary—Low Power—Case IX.

Clump of endometrial glands and stroma cells exhibiting signs of early degenerative change situated at the deepest part of the chocolate "seam" shown in Fig. 14.

Fig. 18.

Right Ovary—Case X.

Section through the ovary in the direction of endometrial invasion, showing a commencing distension in the deeper part of the excavated area. Commencing cavity formation.

Fig. 19.

Ovary—Case XI.

Commencing cavity formation. The ovary is "distended" by chocolate-coloured fluid blood near the surface.

Fig. 20.

Ovary—Case XI.

Cross section through the same ovary. There is no actual cavity formation as yet in the deeper area of invasion.

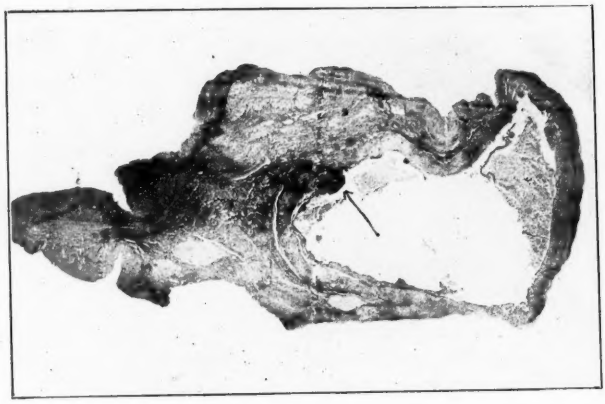

Fig. 21.
Right Ovary—Case X.
Section of the whole ovary as seen in Fig. 18, showing a clump of typical endometrial tissue at the base of the early blood cavity.

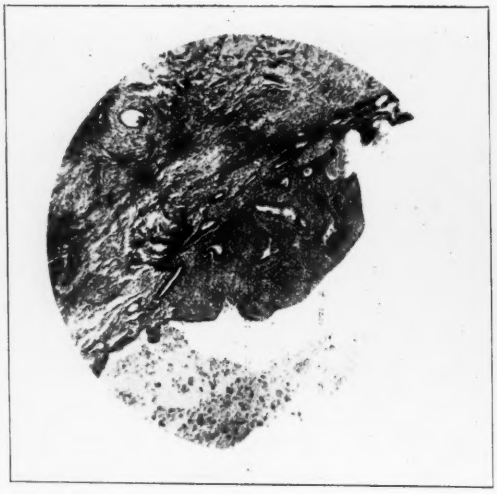

Fig. 22.
Right Ovary—Low Power—Case X.
The typical nature of the endometrial tissue seen in Fig. 21.

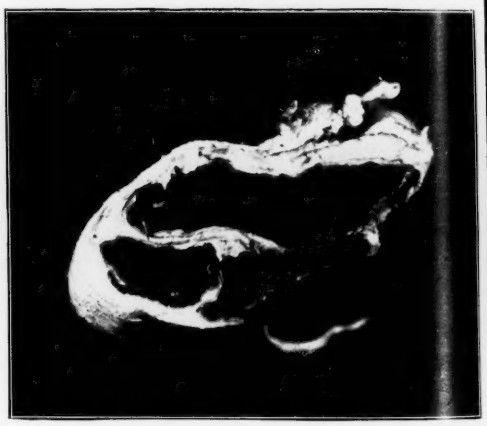

Fig. 23.
Left Ovary—Case IX.
Extensive endometrial excavation of the ovary transforming it into a distended sac containing chocolate-coloured fluid blood. The walls are formed by the thinned-out and compressed ovarian stroma.

Fig. 24.

Left Ovary—Low Power—Case IX.

Remains of degenerating endometrial tissue in a mass of old menstrual blood. From the large ovarian blood cavity seen in Fig. 23.

Fig. 25.

Right Ovary—Low Power—Case XII.

Remains of degenerating endometrial tissue, from the blood cavity seen in Fig. A.

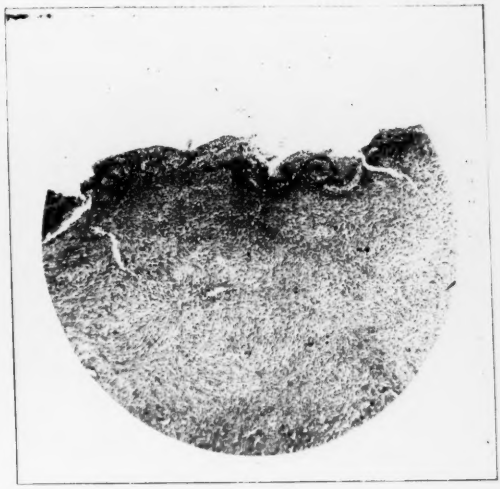

Fig. 26.

Right Ovary—Low Power—Case XV.

The lining of the wall of the ovarian blood cavity in this ovary. I believe that the patches of cellular tissue here shown are remnants of endometrial stromal tissue.

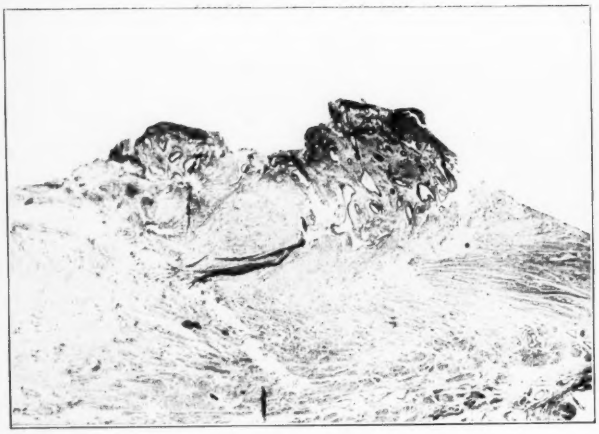

Fig. 27.

Serous Surface of Uterus—Case IV.

Early deposit of typical endometrium on the serous surface of the uterine body.

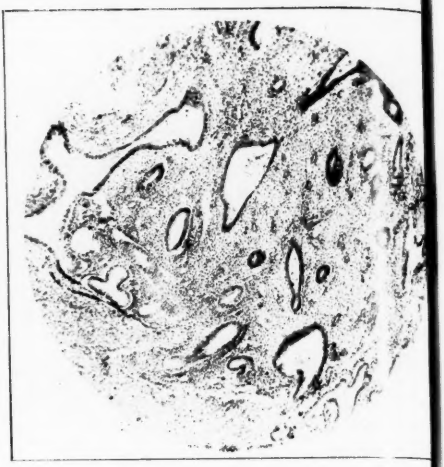

Fig. 29.

Uterine Surface—Low Power—Case IV.

The typical nature of the endometrial tissue primary deposit seen in Fig. 27.

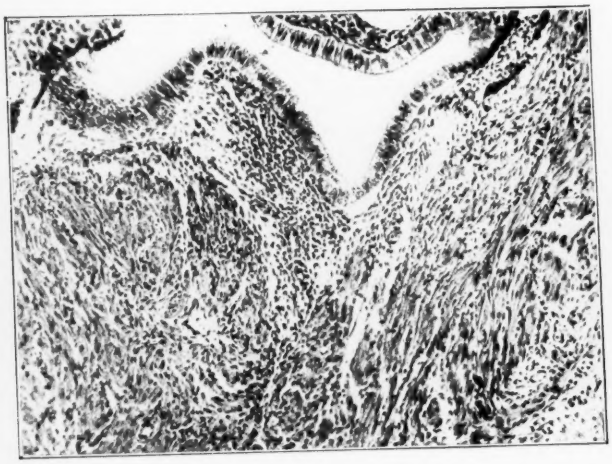

Fig. 28.

Uterine Surface—Low Power—Case IV.

Showing mass of endometrial stroma cells penetrating in between the muscle bundles of the uterine wall in advance of the glandular elements.

From the endometrial deposit seen in Fig. 27.

Fig. 30.

Uterine Surface—High Power—Case IV.

Showing the gradual transition from the t round cell of the endometrial stroma to the l ose s cell situated in the haemorrhagic areas of extrav blood. An endometrial gland is also seen.

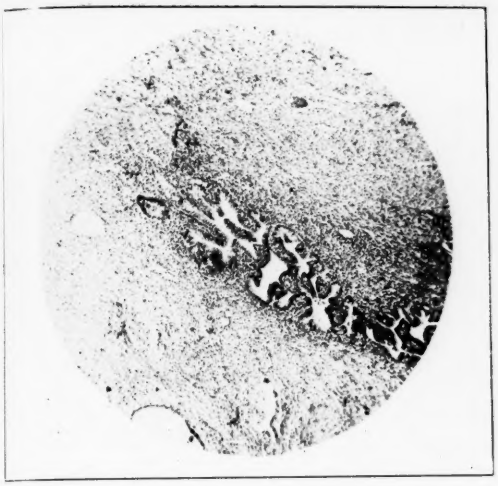

Fig. 31.

Posterior Uterine Wall—Low Power—Case II.

Active endometrial invasion from without. Masses of stroma cells penetrating the uterine musculature in advance of the glands.

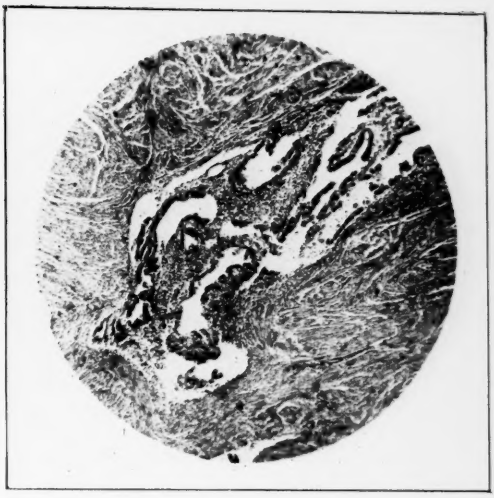

Fig. 32.

Posterior Uterine Wall—Low Power—Case XIII.

A somewhat further advanced condition of Stage I Endometrial invasion of the uterus, showing son commencing degenerative change in the glandul elements.

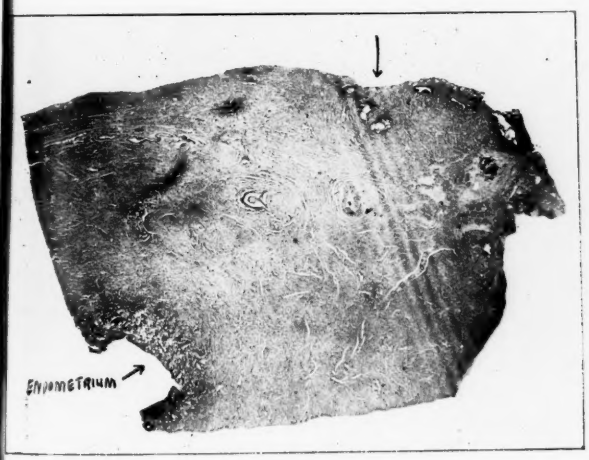

Fig. 33.

Uterine Wall Case XV.

Showing the relatively slight tumour-formation in the uterine body. Red, dilated, endometrial gland spaces 5 mm. below the serous surface.

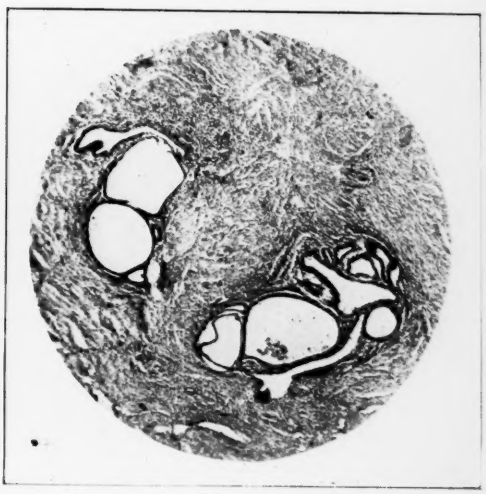

Fig. 34.

Uterine Wall Low Power Case XV.

The typical appearance presented by abnorma placed endometrium of long standing. Dilated gla spaces. Little stroma. No invasiveness.

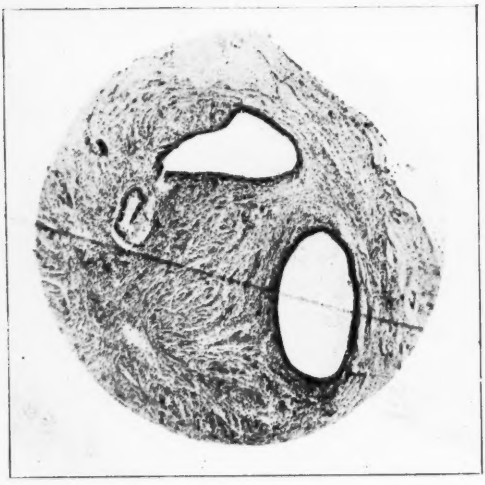

Fig. 35.

" Nodule " from the Recto-Genital Space—Low Power—Case II.

Dilated, atypical gland spaces in thin stromal " bed" situated in mass of fibro-muscular tissue.

Fig. 38.

Fallopian Tube—Low Power—Case XVI.

Endometrial gland spaces in connection with the chocolate " seam " invasion of the meso-salpinx. Typical stroma cells round the more dilated one.

Fig. 36.

Fallopian Tube and Ovary—Case XVI.

Showing two chocolate-coloured patches situated on the peritoneal surface of the tube. Areas of endometrial invasion from without.

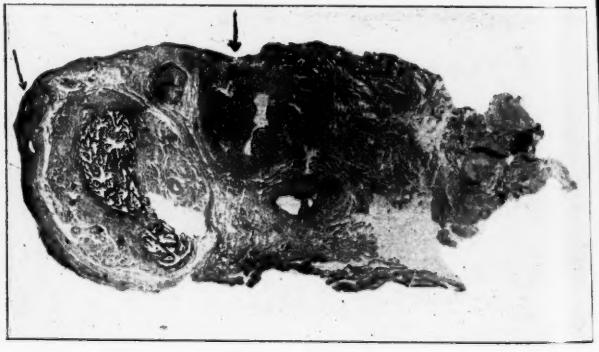

Fig. 37.

Fallopian Tube—Case XVI.

Cross section through a chocolate-coloured patch seen in Fig. 36, showing the general invasion from without inwards of the endometrial tissue. An earlier phase can also be seen in the tubal wall itself.

Fig. 39.
Fallopian Tube—Low Power—Case XVI.
Typical endometrial glands and stroma in tubal wall, just below hæmorrhagic area on its superior surface.

Fig. 40.
Right Ovary—High Power—Case XVII.
The primary deposit of Fallopian epithelial cells on the ovarian surface.

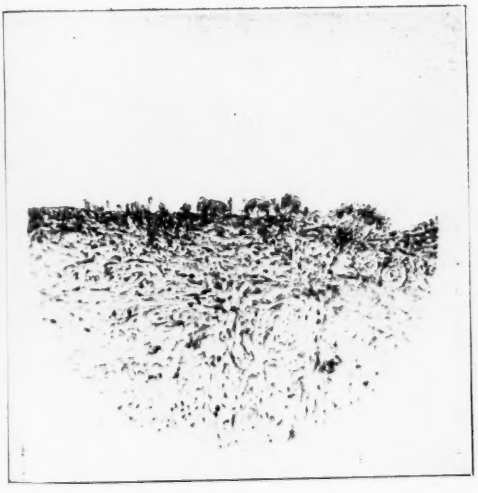

Fig. 41.
Left Ovary—High Power—Case XVIII.
The primary deposit of Fallopian epithelial cells on the ovarian surface.

Fig. 42.
Right Ovary—High Power—Case XVII.
Stage II—showing early indentation of the ovarian surface by Fallopian epithelial cells.

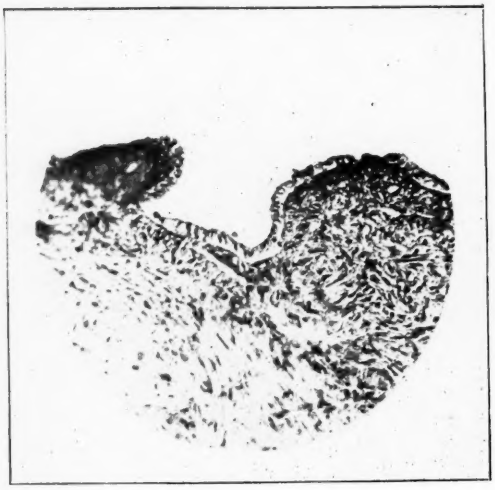

Fig. 43.

Left Ovary—High Power—Case XVIII.

Commencing invasion of the ovarian stroma by Fallopian epithelial cells.

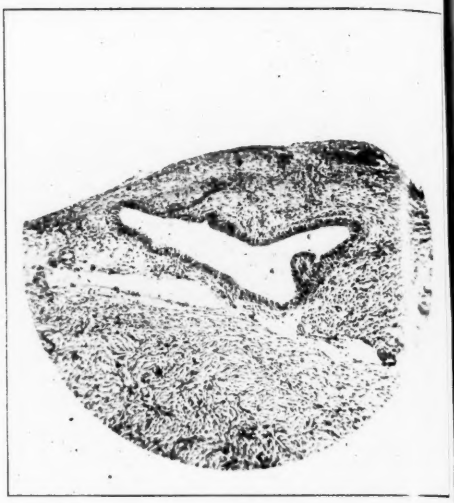

Fig. 44.

Right Ovary—Case XVII.

Single, dilated, Fallopian gland space resting direct on ovarian stroma, with formation of small ingrow resembling a tubal plica.

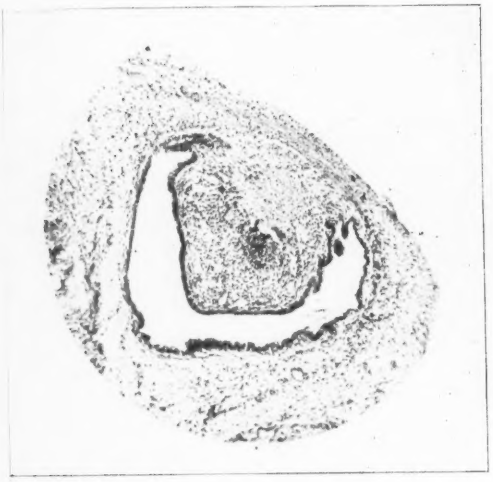

Fig. 45.

Right Ovary—Low Power—Case XVII.

Showing the atypical shape of the Fallopian tube gland spaces. A single, dilated space lined by Fallopian epithelium beneath the ovarian surface.

Fig. 46.

Left Ovary—Low Power—Case XVII.

Another example of the atypical shape of Fallopian gland spaces. The space was situated beneath the ovarian surface opposite to that adherent.

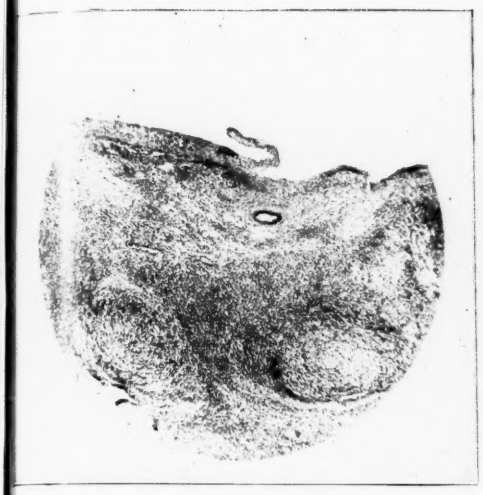

Fig. 47.

Right Ovary—Low Power—Case XIX.

A single, isolated, Fallopian gland space beneath ovarian surface, reacting to menstruation. It is filled with and surrounded by blood.

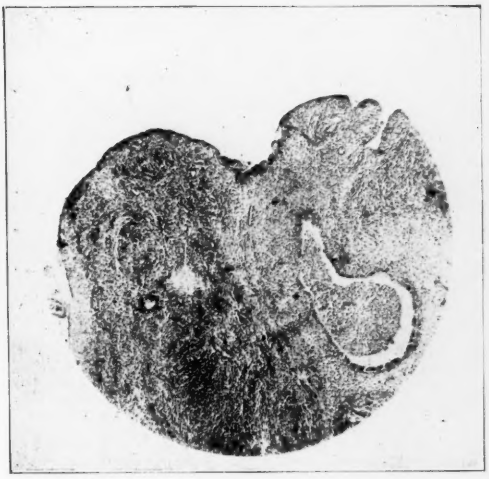

Fig. 48.

Left Ovary—Low Power—Case XVIII.

Single Fallopian gland space beneath ovarian surface containing old blood and exhibiting degeneration of half of its lining epithelium.

Fig. 49.

Right Ovary—Low Power—Case XIX.

Degenerating Fallopian gland space beneath ovarian surface.

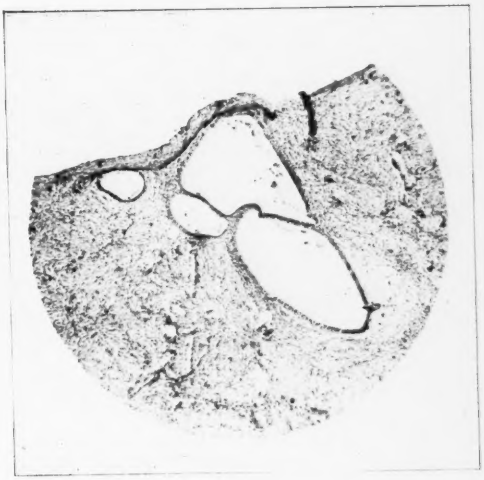

Fig. 50.

Groups of four dilated Fallopian gland spaces beneath ovarian surface.

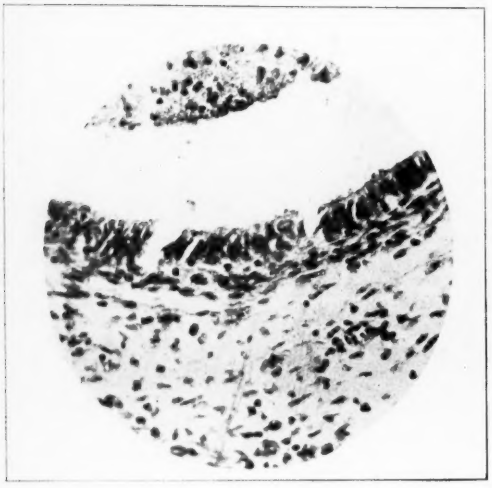

Fig. 51.

Right Ovary—Case XVII.

High magnification of ciliated epithelial cells lining dilated gland space seen in Fig. 50.

Fig. 52.

Left Ovary—Case XVIII.

High magnification showing "dirty," high, unnar ciliated cells lining single gland spac s see Fig. 48.

Fig. 53.

Left Ovary—Case XVII.

Extensive, diffuse invasion of the ovarian surface by Fallopian tube epithelium. This surface was "eroded" and adherent to uterus.

Fig. 54.

Right Ovary—Case XVIII.

Showing general Fallopian invasion over hole of adherent surface in this case.

Fig. 55.
Right Ovary—Case XX.
Gross appearance of ovary affected by Fallopian epithelial invasion. Scattered hæmorrhagic spots over the surface.

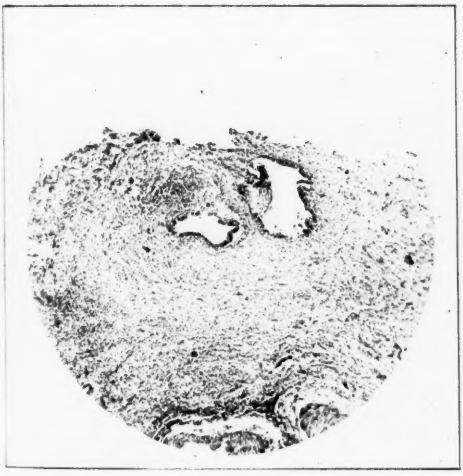

Fig. 56.
Ovarian Ligament—Low Power—Case XVII.
Two Fallopian gland spaces situated immediately beneath surface. Slight hæmorrhagic infiltration of surrounding tissue.

Fig. 57.
Fallopian Tube—Low Power—Case XVIII.
A dilated Fallopian gland space containing blood, situated in the tubal wall. The tubal lumen contains no blood.

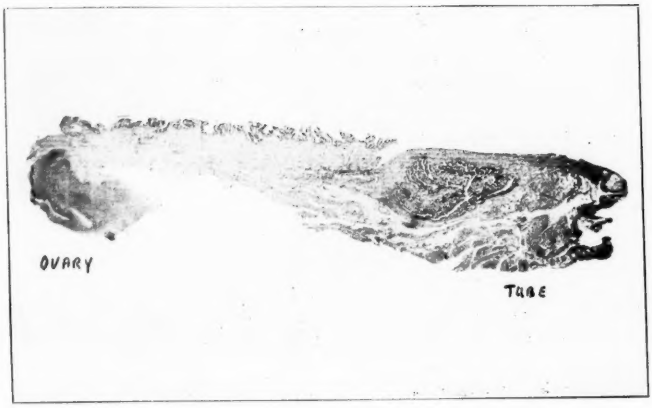

Fig. 58.

Ovary, Fimbria Ovarica and Fallopian Tube—Case XIII.

Showing the Fallopian tube adherent to the edge of a blood cavity in the ovary by means of its long fimbria ovarica.

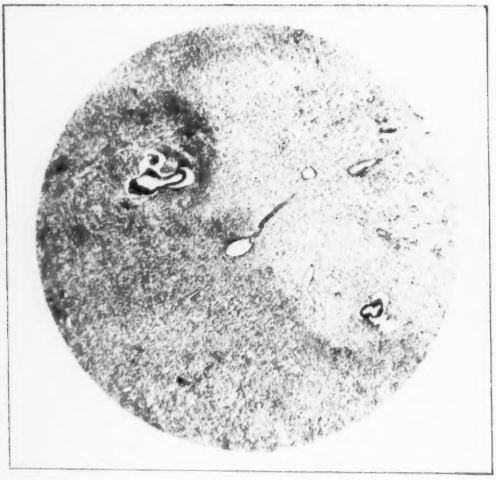

Fig. 59.

Ovary Case XIII.

Two small gland spaces, lined by Fallopian epithelium situated in the ovary. Direct extension from the adherent fimbria ovarica.

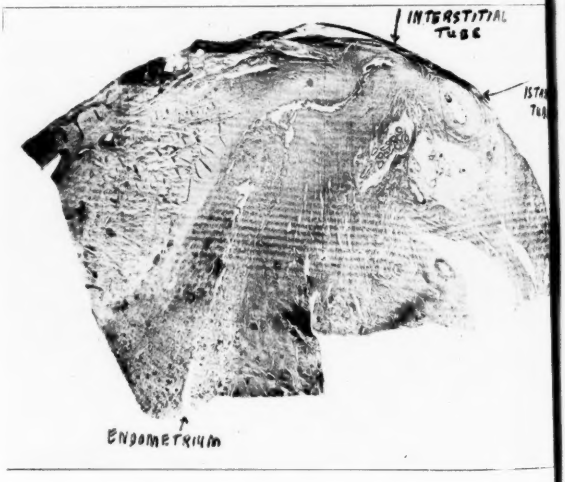

Fig. 60.

Right Uterine Cornu—Case XIX.

A sagittal section cut through the whole uterine cornu, showing the uterine endometrium and interstitial and isthmic portions of the Fallopian tube.

Fig. 61.

Interstitial portion of the Fallopian Tube.—Case XIX.

Blood lying free in the tubal lumen. Not derived by diapedesis from surrounding vessels or spaces.

Fig. 62.

...erstitial portion of the Fallopian Tube. Case VIII.

Free blood in tubal lumen. No derivation from ...thout.

Fig. 63.

Right Uterine Cornu. Case III.

Menstruating endometrium. Extruded blood and endometrial epithelium in the uterine cavity.

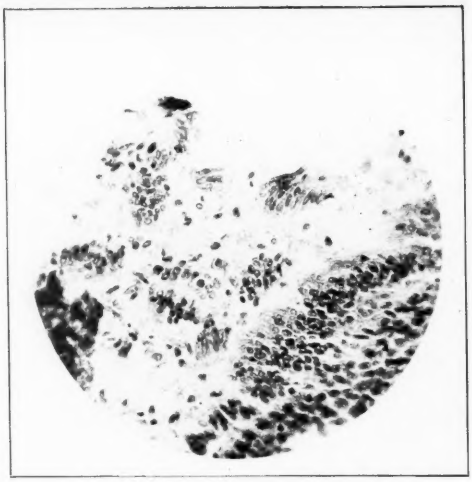

Fig. 64.
Uterine Cavity—Case III.
High power magnification of the extruded blood and endometrial epithelium seen in Fig. 63.

Fig. 65.
Isthmic portion of the Fallopian Tube—Case III.
Free blood and epithelium in the lumen of the isthmic part of the tube. No derivation from without.

Fig. 66.
Fimbrial End of Fallopian Tube—Case III.
Menstrual blood lying free in the tubal lumen.

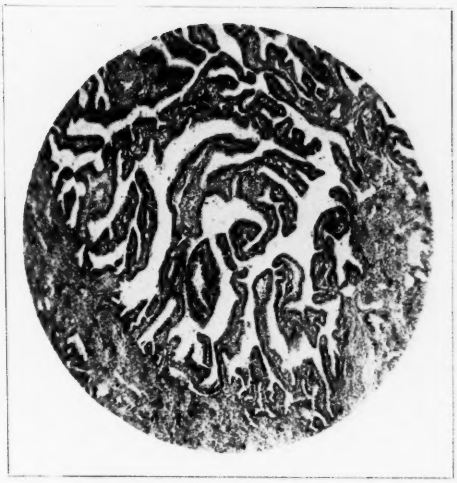

Fig. 67.
Fimbrial End of Fallopian Tube—Case VIII.
Menstrual blood lying free in the tubal lumen.

Fig. 68.
Fimbrial End of Fallopian Tube—Case XIX.
Menstrual blood in tubal lumen.

Fig. 69.
Fimbrial End of Fallopian Tube—Case XX.
Menstrual blood and loose epithelium in tubal lumen.

I have used the term "blood cavity" in relation to these tumours and have referred to "excavation" of the ovary by endometrial tissue. This is in contradistinction to the term "blood cysts" and "haemorrhagic cysts" as used by other authors.

I believe that the ovary becomes adherent to neighbouring structures (*e.g.*, uterine body) during Stage II when slight haemorrhagic erosion or excavation has taken place on its surface (Fig. 3). It may escape adhesion for a time in this stage in which a small space is formed immediately below the surface (Fig. 3), but will sooner or later become adherent as the area of primary deposit of the endometrial tissue becomes larger. The ovary is, therefore, adherent at a very early stage in the life-history of the tumour and remains so during the growth of it. There is no "perforation" of the "cyst" as described by Sampson and others. The mouth of the blood cavity is formed at the commencement of the growth inwards of the endometrial tissue, and the "site of perforation," as mentioned in the literature is this cavity-mouth which is always found glued to a neighbouring structure. I believe therefore that the terms "haemorrhagic cyst" or "tarry cyst" are erroneous and that the correct term for the gross appearance of the tumour as found in the ovary is—that it has produced a "blood cavity" in the ovary. It is purely a process of excavation. There is no cyst wall produced by the activity of the foreign elements. A cavity, not a cyst, has been produced.

I believe that the tissue found in these blood cavities and excavations is endometrium because (i) it is morphologically identical; (ii) its function is the same, viz., menstruation; and this occurs concurrently with menstruation in the uterine endometrium (*cf.* Cases III, VIII, XIV), and (iii) etiologically, as I hope to prove, the glandular and stromal elements are derived from the uterine cavity, being carried along the lumen of the Fallopian tube, expelled *via* the abdominal ostium and deposited upon the ovarian surface as the result of a process of retrograde menstruation or back flow through the Fallopian tubes during menstruation.

B. Endometrial invasion as it affects the uterine body from without.

Concurrently with the deposition on the ovarian surface of endometrial glands or epithelium and stroma, similar deposits occur on the serous surface of the uterine body. These proceed to invade the musculature of the uterus much in the same way as the ovary, but here they appear to find a greater difficulty and the resulting reactive change is much less marked than has been observed in affected ovaries.

In a case in which the ovary corresponds to Stage VI as

Fig. 70.

Fimbrial End of Fallopian Tube—Case XVII.

Mass of old blood and epithelial cells in tubal lumen. Tube removed two weeks after last menstruation.

Fig. 71.

Fimbrial End of Fallopian Tube—Case XVII.

High power magnification of mass of old blood seen in Fig. 70. Loose columnar epithelial cells in close association.

I have used the term " blood cavity " in relation to these tumours and have referred to " excavation " of the ovary by endometrial tissue. This is in contra-distinction to the term "blood cysts " and " hæmorrhagic cysts " as used by other authors.

I believe that the ovary becomes adherent to neighbouring structures (*e.g.*, uterine body) during Stage II when slight hæmorrhagic erosion or excavation has taken place on its surface (Fig. 3). It may escape adhesion for a time in this stage in which a small space is formed immediately below the surface (Fig. 5), but will sooner or later become adherent as the area of primary deposit of the endometrial tissue becomes larger. The ovary is, therefore, adherent at a very early stage in the life-history of the tumour and remains so during the growth of it. There is no " perforation " of the " cyst " as described by Sampson and others. The mouth of the blood cavity is formed at the commencement of the growth inwards of the endometrial tissue, and the " site of perforation," as mentioned in the literature is this cavity-mouth which is always found glued to a neighbouring structure. I believe therefore that the terms " hæmorrhagic cyst " or " tarry cyst " are erroneous and that the correct term for the gross appearance of the tumour as found in the ovary is—that it has produced a " blood cavity " in the ovary. It is purely a process of excavation. There is no cyst wall produced by the activity of the foreign elements. A cavity, not a cyst, has been produced.

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B. Endometrial invasion as it affects the uterine body from without.

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In a case in which the ovary corresponds to Stage VI as

described, signs of tumour formation in the uterine wall may be relatively slight, although definite evidence as to its long standing can be observed.

Notwithstanding the more vague appearances of this tumour when situated in the uterine wall, however, the invasive process passes through fairly well defined stages, and the life-history of endometrial tissue invading the uterine body from without can thus be accurately followed.

Stage I. The first stage is that of an implantation on the uterine surface of a clump of endometrial glands or epithelium and stroma cells. Fig. 27.

In Case IV can be seen an example of this primary endometrial deposit on the serous surface of the uterus. The deposit is of typical endometrium, visible to the naked eye as a small diffuse hæmorrhage area of the uterine surface, and indistinguishable morphologically from the endometrium of the uterine cavity in this same case, but having no connexion with it whatsoever. The cells also are typical, and gradual transition stages between them and the looser spindle-shaped cells into which they are transformed by the action of the extravasated blood can well be seen (see description of cases Case IV). These endometrial stroma cells form themselves into small masses which precede the actual glandular elements and, as it were, prepare the way for their advance by penetrating in between the muscle bundles of the uterine wall. Figs. 28 and 30.

It will be remembered that the endometrial invasion of the right ovary in this case was in Stage III of its life-history—the active invasive and proliferative stage (Fig. 10). The condition of this endometrium, therefore, corresponds accurately with that observed as an implantation on the serous surface of the uterus in the same case (Fig. 29). I therefore believe that the two processes of endometrial invasion, *i.e.*, of the ovary and uterus respectively, originated approximately at the same time, as would be the case if the endometrial elements were deposited on their surface at the same time, which is the case.

It is also apparent, in this stage, that the abnormally placed endometrium has no connexion with, and is not derived from, serosal endothelium as suggested by Iwanoff. The site of this primary endometrial deposit on the uterine surface was definitely separate and apart from the area of adhesion between ovary and uterus in this case.

Stage II. The next stage in the life-history of endometrial invasion of the uterine body from without is that of active penetration and proliferation. Here all evidence of the origin of the abnormally situated tissue has disappeared, but one can observe it

growing inwards through the muscle walls of the uterus—the glands being everywhere preceded by clumps of stroma cells which are pushing their way in between the muscle bundles. Endometrial tissue may have penetrated to a depth of from 2—10 mm. in this stage. The glandular elements show no sign of degenerative change and the general microscopical appearance is one of great activity. Notwithstanding this, however, the reactive change or tumour-formation produced by the invasion of the uterus is not nearly so great as that produced in the ovary at a corresponding stage. I have noticed that this stage in the uterus accurately corresponds to Stages II and III in affected ovaries, *i.e.*, stages in which the invasive endometrial elements are in a state of great activity and before degeneration has begun.

The uterine wall of Case II exhibits this stage (Fig. 31). The affected ovary in this case was in Stage II of its life-history.

In the invaded uterine wall of Case XIII this stage is also observed but in a more advanced condition, the epithelium of the glandular elements exhibiting signs of early degeneration. Fig. 32.

A feature of this stage, and one which is constant while activity remains, is the presence of relatively large quantities of endometrial stroma cells around and in advance of the glandular tissue. As the condition becomes older the stroma cells gradually diminish until they almost disappear.

Stage III. The last stage is characterized by microscopical evidence of retrogressive change in the misplaced endometrium. The glands have become widely dilated and are lined by cuboidal or low epithelium. They are usually empty but sometimes contain old blood. They are surrounded by a thin bed of stroma cells which do not exhibit any invasive activity, and the whole tumour-formation has apparently ceased to grow or invade and is now undergoing slow retrogressive change. This wide dilatation of the glands and paucity of stroma cells is typical of an old-standing condition, and I have always found this appearance in the uterus in those cases in which the affected ovaries showed any advanced stage—Stages IV, V, VI.

The relatively slight tumour-formation found in the uterine body as compared with that in the ovary of the same case is well exemplified in Case XV (Figs. 33 and 34). Here the condition in the uterus was obviously of long standing, but the endometrial tissue had only penetrated to a depth of about 5 mm. below the serous surface, yet the ovaries of the same case were distended to the size of tangerine oranges by endometrial excavation.

The site of any endometrial invasion of the uterine wall from without can be seen by the naked eye as a diffuse hæmorrhagic area on the uterine surface, varying in diameter from 1 mm. to 5 mm.

This refers to the uterine body only and, of course, does not include the diffuse thickening of the posterior cervical wall caused by "adenomyomatous" growth, described in the literature. In my cases, however, the cervix has never been so affected, and in a few only have there been found definite " nodules " of growth in the recto-genital space. I do not regard these " nodules " as important from an etiological standpoint. I am sure that their origin is the same as that of any other manifestation of the growth in the pelvis. On section they present the microscopical appearance of dilated gland-spaces, few and discrete, situated in a thin " bed " of endometrial stroma cells and surrounded by a mass of fibro-muscular tissue. Fig. 35.

The life-history of endometrial invasion of the uterine body from without falls roughly into the three stages described, and the importance of this lies in the fact that these stages correspond accurately as regards age to the condition as found in the ovary in any particular case. I deduce from this that the initial process commenced at the same time in both organs, not at widely different periods, as would be the case if the ovary were the " primary site " of the tumour, and other manifestations of it in the pelvis were secondary to " rupture " of the "ovarian hæmatoma," as suggested by Sampson.

C. Endometrial invasion as it affects the Fallopian tube (from without).

Case XVI exemplifies this condition. This is the only case that I have seen in which the Fallopian tube has been definitely invaded from without by endometrial tissue. (See description of Case XVI.)

The gross appearance is that of one or more chocolate-coloured patches—about 2 mm. in diameter—situated on the peritoneal surface of the Fallopian tube. Fig. 36.

On section of the tube the chocolate invasion is seen to penetrate to a depth of half way through the whole thickness of the broad ligament adjacent to the Fallopian tube wall. Fig. 37.

Microscopically, this chocolate area is found to be occupied by clumps of old, dilated endometrial gland-spaces, each supported by a thin " bed " of typical endometrial stroma cells—the fact which stamps their nature—and situated in a mass of old blood and phagocytic cells. Fig. 38.

An earlier manifestation of this same condition is seen on the upper surface of the wall of the Fallopian tube, a diffuse hæmorrhagic area being here situated. Microscopically, there is situated beneath this area a clump of much more typical endometrial gland-spaces, with relatively large numbers of stroma cells in association

with them; the whole situated in the tubal wall, mid-way between the serous surface and the lumen. Fig. 39.

That these are endometrial gland-spaces I have no doubt, because of the associated typical stroma cells which are never present in the Fallopian tube type of invasion.

I conclude here the life-history of the endometrial type of this tumour as found in the ovary, uterus and recto-genital space, and the Fallopian tube, and regard all other sites at which it may be found as both rare and unimportant from the etiological point of view.

I will now proceed to describe the life-history of the Fallopian tube type of this condition.

The Life-history of the Fallopian Tube Type.

Cases XVII, XVIII, XIX and XX of my series belong to this type.

Like the endometrial type, the life-history of the Fallopian tube type can best be traced from the appearances of it as found in the ovary. In classifying the whole condition into these two types, I briefly stated the chief differences between them, both macroscopically and microscopically. I should very much like to have stated another difference between the two types, viz., that the Fallopian tube type of invasion never affects the uterine body as does the endometrial type. In my cases I have always failed to find any trace of misplaced Fallopian tube epithelial elements in the uterine body. However, to make a definite statement of this nature is impossible, as to prove it, serial sections through the whole uterine body would have to be cut, and shown devoid of Fallopian tube tissue, in a case in which the ovary was affected. Notwithstanding this I do believe that the uterus is not affected by this type, both on account of my failure to find it therein, and knowledge of the relatively slight invasive property of Fallopian tube epithelium as seen in the ovary, which convinces me that penetration into the much more "resistant" or "unsuitable" uterine musculature by this epithelium would be impossible.

Stage I. Like the endometrial type this stage is not visible to the naked eye. It consists of a deposition on the ovarian surface of a mass or strip of loose Fallopian tube epithelial cells of the same morphological characteristics as those seen to be lining the tubal plicæ. These cells are very different from the clean-cut, columnar cells which line the endometrial gland-spaces. They are of a high cylindrical variety. Their sides are concave, the middle of the cell body appearing constricted. Their surfaces are relatively broad and are ciliated. The nuclei are situated nearer the surface than the base. These cells are packed closely together in a somewhat

disorderly manner when observed in rows, and a constant feature is that their surfaces present a " dirty " appearance due to adherent particles of blood *débris* (fibrin), which have apparently been attracted by, and entangled in, the cilia attached to them.

In whatever stage, Fallopian tube invasion of the ovary is observed, whether the condition be far advanced or not, the invading cells always exhibit this " dirty " appearance and the presence of cilia, and this fact alone is sufficient to differentiate this type from the endometrial type, the cells of which are never ciliated, their surfaces always appearing " clean."

The right ovary of Case XVII shows this stage (Fig. 40). Also the left ovary of Case XVIII. It can be seen that there is no connexion between these cells and ovarian germinal epithelium. There is no gradual transition stage between the two. It is apparent that they are lying loosely—some on their sides and some on their ends—on the surface of the ovary. They present the typical appearance of having been deposited there from without, which, I believe, is the case. Their morphological characteristics can be made out as described—especially in the left ovary of Case XVIII (Fig. 41).

Stage II. The next stage is that of commencing invasion of the ovarian stroma by these cells. This takes the form of a minute indentation in the ovarian surface lined by the invading cells, and a very slight rarefaction of the subjacent tissue. It will be noticed that—as in Stage I—there is no evidence of endometrial stroma cells in association with this abnormally placed epithelium, also that the cells terminate abruptly on the ovarian surface and have no connexion with the germinal epithelium. The right ovary of Case XVII and the left ovary of Case XVIII exhibit this stage (Figs. 42 and 43.)

The typical " dirty " appearance of the cell surfaces is very noticeable in the ovary of Case XVII (Fig. 42). This stage also is not visible to the naked eye.

Stage III. From this point penetration of the ovarian stroma continues until a stage is reached at which one or more definite gland-like spaces are formed at short distances below the ovarian surface. Often only one space is formed, rarely more than three or four together. These spaces are widely dilated, atypical in shape, as compared with endometrial gland-spaces, and lined by the high, columnar, ciliated cell of the Fallopian tube type. They always rest directly on the ovarian stroma. They have no " bed " of stroma cells, as have the endometrial gland-spaces, only a relatively slight rarefaction of the surrounding ovarian tissue, brought about in many of the cases by the effect of extravasated blood in the vicinity.

Many of these Fallopian tube gland-spaces contain a mixture of old and new blood elements, and blood is extravasated throughout the surrounding tissues in many cases, especially if the tissue is related to menstruation (see Case XIX, Fig. 47).

I believe that the invading Fallopian tube epithelium situated in the ovary reacts, in some measure, to menstruation, probably on account of its intimate association with ovarian secretions.

Occasionally one can observe an attempt to reproduce Fallopian tube structures in these gland-spaces. The right ovary of Case XVII, which shows this stage, exhibits as well an attempt at the formation of a tubal plica in a typical Fallopian tube gland-space situated beneath the ovarian surface (Fig. 44). The small ingrowth into the lumen of the gland possesses a central fibrous supporting column, like a tubal plica. The gland-space is lined by the typical high, columnar, ciliated cell of this type, and rests directly on the ovarian stroma with no intervening "stromal bed."

Another example of the atypical shape and isolated nature of these gland-spaces is also seen in the right ovary of Case XVII (Fig. 45), and another is seen in the left ovary of Case XVII. The gland-space here shown was situated beneath the opposite surface of the ovary from that which was adherent and which exhibited an advanced stage of invasion (see Fig. 53). This fact shows that any surface of the ovary can equally become the site for Fallopian invasion (Fig. 46).

The right ovary of Case XIX shows a small, isolated, Fallopian tube gland-space, filled with blood, and situated in a highly hæmorrhagic area. In this case the uterus was menstruating, and I believe that here can be seen the reaction to menstruation of this Fallopian tube derivative situated in close association with ovarian secretions. (Fig. 47.)

Stage IV. From this point onwards the abnormally placed Fallopian tube elements begin to degenerate. Very little further penetration takes place. The affected ovary is never deeply invaded. Excavation never takes place. Even when the Fallopian tube gland-spaces are yet more widely dilated and degeneration of their epithelium is advanced, they are never found deeper than $\frac{1}{4}$ inch below the ovarian surface.

The left ovary of Case XVIII shows a typical Fallopian tube gland-space beneath its surface, in which degeneration has taken place in about half of the lining epithelial cells. This space is filled with old blood and large phagocytic cells, and some hæmorrhagic extravasation has taken place in the ovarian tissue around the degenerated portion of the gland. (Fig. 48.)

The right ovary of Case XIX also shows a degenerating Fallopian tube gland-space (Fig. 49). It can be seen that the lining

epithelial cells have, for the most part, become obliterated, and that the gland-space is gradually losing its contour, as such. It is filled with old blood and phagocytic cells.

In the right ovary of Case XVII there is a group of four dilated Fallopian tube gland-spaces. This is the most that I have seen together. It is apparent that their activity from an invasive point of view has ceased, although they extend to less than $\frac{1}{4}$ inch below the ovarian surface. (Fig. 50.)

I have previously described the type of cell which lines these spaces. Its nature is well defined under the oil immersion lens. The closely packed, high columnar type of cell, with its concave sides and broad surface bearing cilia, and dusted by light fibrinous *débris*, can be well recognized under this high magnification. Figs. 51 and 52.)

With degeneration of the epithelial cells lining these gland-like spaces and extravasation of the contained blood into the surrounding ovarian stroma, the life-history of Fallopian tube epithelial invasion of the ovary comes to an end.

The great difference in the relative virulence of the two types of epithelial invasion can now be seen. Whereas the endometrial tissue gradually eats away the greater part of the ovary, the Fallopian tube tissue never produces any very extensive change. In Cases XVII and XVIII when the left and right ovaries were respectively adherent to the uterine body, their adherent surfaces showed the most extensive change that I have as yet observed in the Fallopian tube type. Actual erosion of the ovarian surfaces had taken place, and microscopically it was apparent that a large area of the ovarian surface was being invaded by Fallopian tube epithelium (Figs. 53 and 54). The ovarian surface is seen to be superficially indented by epithelial ingrowths of no great invasiveness, but extending over the whole adherent area. Although this is an extensive type of Fallopian tube invasion, and creates in the ovary a more widespread lesion, it cannot be classed as a further stage in its life-history, as here the invading elements are in the relatively early stage of activity.

The presence of Fallopian tube epithelial elements in an ovary can be suspected on a naked-eye examination by the presence on the ovarian surface of small, discrete hæmorrhagic blebs or spots, varying in colour from bright red to black, according to age, *e.g.*, the gland-space in Fig. 47 could be seen by the naked eye as a bright red bleb on the ovary, those in Figs. 44 and 45 as dark hæmorrhagic spots, while those in Figs. 48 and 50 appeared as almost black blebs to the naked eye. The gland-space seen in Fig. 49 was manifested grossly as a depressed scar on the ovarian surface, and

this I believe to be the oldest outward appearance of the presence of Fallopian tube tissue beneath the ovarian surface.

The right ovary in Fig. B shows the gross appearance of an ovary affected by Fallopian tube invasion.

The ovary in Case XX also shows the typical gross appearance of this type. (Fig. 55.)

The only other situations in which I have found evidence of Fallopian tube epithelial invasion are (i) in the right ovarian ligament of Case XVII, and (ii) in the Fallopian tube wall of Case XVIII.

In (i) there could be detected, by the aid of a hand lens, a minute hæmorrhagic spot on the surface of the ovarian ligament. Microscopically, this proved to be the surface appearance presented by two Fallopian tube gland-spaces situated immediately beneath the surface of this ligament. There was some slight hæmorrhagic infiltration in the tissues immediately surrounding these spaces, but they themselves were empty of blood elements. They were lined irregularly by cells of the typical Fallopian tube type (Fig. 56).

In (ii) the presence of a complete gland-like space in the Fallopian tube wall near its fimbrial end (Case XVIII) appeared pathological, although it is difficult to prove its nature definitely. The tubal lumen in this case was empty—the time of operation corresponded with an inter-menstrual period of the patient—but this dilated gland-like space, lined by Fallopian tube epithelium, contained a quantity of blood—a fact which gave to it the appearance of having been produced by an invasive process. (Fig. 57.)

ETIOLOGY.

The etiology of this extra-uterine pelvic tumour has been a subject of much controversy during the last twenty years, and especially since the publication of Sampson's paper on "Perforating Hæmorrhagic (chocolate) Cysts of the Ovary" in 1921. Many theories have been advanced to account for the presence of endometrium-like tissue in the ovary. A number were based upon close anatomical relationships during development, giving rise to congenitally misplaced epithelium or "rests." Anomalies of growth of germinal epithelium have been made to account for other instances, while theories based upon the effects of inflammation and metaplasia of serosal endothelium are numerous. Williams remarks concerning the origin of epithelial elements in the ovary: "Indeed the number of theories advanced has been limited only by the number of structures entering into the composition of the ovary."

I have dealt with these etiological theories advanced by well-known authors in the Historical Note, and will now proceed to

describe my reasons for the belief that this tissue, as found in the ovary or other pelvic organs, is derived entirely from without—that no structure entering into the composition of any of the affected organs is responsible for the condition found in them.

From the study of my cases I conclude that endometrial or Fallopian tube epithelium is carried along the tubal lumen during menstruation and expelled *via* the abdominal ostium into the pelvic cavity as the result of a process of retrograde menstruation or back flow through the Fallopian tubes, there to become implanted upon and grow into the ovary and other pelvic organs. I have shown, in describing the life-history of the two types of the condition, that the tumour-formations in any one case, wherever situated, were approximately of the same age. One never sees an advanced stage of the tumour in an ovary associated with an early stage on the uterine surface, as would be the case if the ovary were the " primary site " or " intermediary host, hot bed or incubator," as suggested by Sampson.

I believe that the tumour-formations throughout the pelvis in any one case all commence to grow at approximately the same time, as the result of the simultaneous deposition of epithelium of endometrial or tubal origin on the surfaces of the various organs. I do not agree with Sampson that the " ovarian hæmatoma " grows gradually in the depths of the ovary and eventually " perforates " and sheds its chocolate-coloured contents on to the other pelvic organs, where epithelial elements contained in this fluid implant themselves and grow. I maintain that there is no " perforation " properly so-called. The affected ovary becomes adherent to a neighbouring structure (*e.g.*, uterine body) during Stage II of the life-history of the tumour, at the stage when slight hæmorrhagic erosion or excavation has occurred on its surface. This is sufficient to bring about adhesion, and from this time onwards the ovary remains adherent—only more densely so as the superficial hæmorrhagic erosion becomes more diffuse—and endometrial excavation goes on inside the ovary from this starting point, until the ovary is transformed into a distended sac, filled with chocolate-coloured fluid blood, but still densely adherent to its former site. The " perforation " is the mouth of this blood cavity : the " chocolate fluid " contained in it is inert—from the point of view of starting secondary deposits on other organs if in contact with them—because it is the evidence of long-retained menstrual blood. It is only found in relatively advanced stages, and is made up of a mixture of old blood cells, blood pigment, phagocytic cells and degenerated epithelial cells. There is nothing in this " chocolate fluid " that is capable of growing.

This statement is made on histological grounds, although I

have performed an experiment to test the invasive activity of this chocolate-coloured fluid blood.

Five ccs. of this fluid, obtained aseptically during operation, from the ovary of Case XII, was injected into the peritoneal cavity of a female rabbit in the region of the pelvic organs. After an interval of four weeks the rabbit was killed and the pelvis explored, but no sign of adhesions or affection of the ovaries could be found. It is not to be expected, of course, that this fluid, even if containing active cellular elements capable of invading the human organs, would necessarily be able to affect similarly those of the rabbit. The experiment was made, however, in the course of a routine examination of the chocolate-coloured fluid. Cultures were also made from this fluid, but there was no evidence of bacterial growth on stock culture media.

I have found evidences of different stages of the growth in the same ovary. For example, Case I exhibits both Stage I and Stage III in its life-history. This fact shows that the process of retrograde menstruation may occur more than once, and I believe that in many cases this phenomenon is of regular monthly occurrence, but that a deposition of endometrial or Fallopian tube epithelium on the pelvic organs does not necessarily occur, or if so, does not invade at every menstrual period.

The close proximity of the abdominal ostium of the Fallopian tube to the ovary undoubtedly accounts for the ovary being the site of election for these tumours. As Sampson says: "The escape of the ovum from the ovary into the Fallopian tube during ovulation is an evidence of the close contact of the opening of the tube and its fimbriæ with the surface of the ovary." Added to this is the fact that the ovary, without doubt, provides the most suitable "soil" for the growth of abnormally placed epithelium of this nature, and will consequently exhibit evidences of endometrial or Fallopian tube epithelial invasion in a much greater percentage of cases in which general depositions have occurred throughout the pelvis than would any other organ.

In some of my cases the fimbrial end of the Fallopian tube has been actually adherent to the affected ovary by means of its long fimbria ovarica. Case XIII shows this condition. Here the fimbria ovarica was adherent to the edge of a blood cavity in the ovary, situated on its antero-inferior surface. I had hoped to find evidences of endometrial invasion in the portion of the ovary excised with the fimbria ovarica, but was unsuccessful. Serial sections through the Fallopian tube, fimbria ovarica and ovary were cut and from these it could be observed that the actual contact between Fallopian tube fimbrial epithelium and ovarian stroma enabled the former to invade the latter. At any rate, a few small

gland-like spaces lined by Fallopian tube epithelium could be seen situated in the ovarian stroma and lying directly on it. The origin of these spaces is obviously by direct extension from the adherent fimbrial epithelium, but the appearance is interesting as a proof that Fallopian tube epithelium is able to invade or penetrate ovarian stroma. (Figs. 58 and 59.)

This appearance agrees with the work of Marchand[9] and Williams[10] as mentioned in the historical note.

In describing the life-history of the endometrial and Fallopian tube types, I have demonstrated the appearance of each (with regard to the ovary) in Stage I—Figs. 1 and 41. It is apparent that the epithelial elements here shown on the ovarian surface have no connexion whatever with ovarian germinal epithelium, as suggested by Waldeyer[8] and others, but that they are of the nature of a deposit or implantation on the ovarian surface from without is, I think, equally apparent. I have never found endometrial or Fallopian tube epithelial invasion in an ovary in which its origin could not be traced by serial sections to the ovarian surface, no matter what stage in the life-history of the condition had been reached. From this fact and the appearance of both types as demonstrated in Stage I, I believe that this abnormally placed tissue found in the ovary emanates from without. That it does not reach the ovarian surface from without by extension along any one particular route, *e.g.*, by growth along the ovarian ligament or through the broad ligament or from the uterine body, is shown by the fact that (i) no particular aspect of the ovary is affected in every case, *e.g.*, the right ovary of Case XVII exhibited Fallopian tube epithelial invasion on its lateral aspect and free border, while the left ovary in this case was similarly affected on its antero-inferior surface. Also, the right ovary in Case VIII can be seen to be affected by endometrial invasion on its antero-inferior and lateral surfaces respectively. Many of the other cases also prove this point. (ii) serial sections through the ovarian ligament fail to show any evidence of misplaced epithelium in cases in which the corresponding ovary is affected. (iii) there is often no evidence of epithelial invasion of the uterine body in cases in which an ovary shows this condition. (iv) an affected ovary in either type is not necessarily adherent to neighbouring structures. This fact appertains particularly to the Fallopian tube type, *e.g.*, the right ovary of Case XVII was non-adherent. I have only found an ovary affected by endometrial invasion non-adherent in one instance. This is the left ovary of Case III. Here a small blood space had been formed below the ovarian surface (Stage II). This is a very early stage, and I believe that this ovary would have become adherent as soon as the primary implantation area on its surface had become a little more

diffuse and hæmorrhagic. However, this case is sufficient to show that the ovary has not become affected as the result of direct endometrial spread from some other organ. (v) The ovaries may not be affected at all in a case from which can be demonstrated the presence of endometrial tissue in another pelvic situation. In Case VI there is definite endometrial invasion from without of the posterior uterine wall, but both ovaries are non-adherent and do not exhibit any sign of this condition, a fact which also negatives the possibility of the ovary being the "primary site," and all other evidences of the tumour in the pelvis being secondary.

From these facts, therefore, I believe that endometrial and Fallopian tube epithelium found in ovaries emanates from without, and that it has not spread thence from any of the neighbouring pelvic structures.

In my attempt to prove that epithelium of these types originates from the uterine cavity and the lumen of the Fallopian tube, and that it is expelled, during menstruation, through the abdominal ostium of the Fallopian tube and deposited simultaneously upon the surfaces of the ovary and other pelvic organs, I have examined by serial sections the uterine mucosa and lumina of the interstitial, isthmic and fimbrial portions of the Fallopian tubes in specimens affected by this condition, which were removed during menstruation.

The uterus and appendages of Cases III, VIII and XIV, affected by endometrial invasion, were removed during menstruation. Those of Cases XIX and XX affected by Fallopian tube epithelial invasion were removed during menstruation. The uteri of Cases III, VIII and XIX were removed very carefully by Dr. Dougal without clamps being applied to the uterine cornua. This was done to negative the possibility of causing hæmorrhagic effusion into the tubal lumina by trauma during removal. I have, however, cut a number of control sections of Fallopian tubes removed in the ordinary way (*i.e.*, with clamps applied to the uterine cornua) in cases of fibroid uterus and other non-inflammatory conditions, but have never found free blood elements in the Fallopian tube lumen such as I have done in Cases III, VIII, XIX and XX. I therefore look upon this appearance as definitely pathological.

Examination of the uterine mucosa, interstitial and isthmic portions of the Fallopian tube, by means of serial sagittal sections cut through a uterine cornu of any one of these cases removed during menstruation, shows that the uterine mucosa is actively menstruating and that the lumina of the interstitial and isthmic portions of the Fallopian tube contain a quantity of free blood cells. This blood has no histological connexion with the blood contained

in vessels or spaces in the adjacent uterine or tubal wall. Empty spaces can be seen abutting on the epithelial lining of the Fallopian tube in these vicinities, and there is no evidence of "raising up" of the tubal epithelium by collections of blood beneath it analogous to that often seen in endometrial epithelium during menstruation.

There is also no hæmorrhagic effusion in the adjacent muscular tissue of the uterine or tubal walls, from which this blood could have been derived. I therefore conclude that its presence here is brought about by means of a back flow from the uterine cavity and that the blood contained in the tubal lumen in these two vicinities is menstrual blood.

A sagittal section cut through the right uterine cornu of Case XIX gives an idea of this method of examination. Here the uterine mucosa and interstitial and isthmic portions of the Fallopian tube can be seen, and it is in the interstitial portion of this Fallopian tube—as well as in that of Case VIII—that free blood elements were found. Case XIX belongs to the Fallopian tube type, and Case VIII to the endometrial type (Fig. 60).

A larger magnification of the interstitial portion of the Fallopian tube shown in Fig. 60 is seen in Fig. 61. Free blood can be seen in the tubal lumen and spaces empty of blood can be seen abutting on the basement membrane of the tubal epithelium. There is no hæmorrhagic effusion in the adjacent uterine wall. Clamps were not applied to this cornu during removal of the uterus.

The interstitial part of the Fallopian tube in Case VIII can also be seen to contain blood lying free in its lumen and apparently not having been derived by process of diapedesis from blood in adjacent vessels or spaces or as the result of a general hæmorrhagic infiltration (Fig. 62).

In Case III, by serial sagittal sections through the right uterine cornu, the uterine cavity can be seen, lined by an orderly row of columnar epithelial cells and surrounded on all sides by actively menstruating endometrial glands and stroma. The row of columnar epithelial cells actually lining the cavity can be seen to be occasionally raised up by collections of menstrual blood beneath it and a mass of blood cells and desquamated epithelial cells can also be observed to have been extruded into the cavity itself. In this case I do not think this histological appearance is due to trauma in cutting the sections. The epithelial lining of the uterine cavity is so well defined that I believe that this mass of blood and epithelium has been extruded into the uterine cavity *via* the opening of glands on its surface. I believe that here can be seen the initial process which leads on to back flow of this extruded menstrual blood and endometrial epithelium through the lumen of the Fallopian tube. (Fig. 63.) (As a matter of interest and comparison, this actively

menstruating endometrium is practically indistinguishable morphologically from that seen to be invading the right ovary of the same case (Fig. 9).

Under high power magnification the epithelial elements in this mass of loose blood in the uterine cavity can be clearly distinguished. They are of the typical columnar type of the uterine endometrium. (Fig. 64.) The isthmic portion of the Fallopian tube in this case (Case III), included in the sagittal section of the right uterine cornu, is seen to contain a quantity of loose blood, and a few loose epithelial cells are also present in its lumen. Here again there is no histological evidence of the derivation of this blood from vessels or spaces in the wall of the Fallopian tube, and there is no general hæmorrhagic infiltration in this vicinity to account for it. In this case also the uterus was removed without the application of clamps to the uterine cornua. The Fallopian tube in this region was therefore intact and undamaged. Moreover the quantity of this free blood is too great to have emanated from adjacent structures in the non-hæmorrhagic condition in which they are seen, and I again conclude that in this case the blood seen in the lumen of the isthmic part of the Fallopian tube is menstrual blood and is derived from the uterine cavity. Here, as in Cases VIII and XIX, the process of retrograde menstruation is in progress. (Fig. 65.)

By serial sagittal sections through the uterine cornua of Cases III, VIII and XIX—removed, without damage, during menstruation—the presence of regurgitant menstrual blood is demonstrated in the interstitial tubal lumen of Cases VIII and XIX (endometrial and Fallopian tube type respectively) and in the isthmic tubal lumen of Case III (endometrial type). I do not regard the presence of the loose epithelial cells found in the lumen of the isthmic part of the Fallopian tube in Case III as significant, on account of the impossibility of differentiating them from the cells lining the Fallopian tube in the vicinity.

To trace further the course of the regurgitation of menstrual blood through the Fallopian tubes, serial cross sections were cut through $\frac{1}{4}$ to $\frac{1}{2}$ inch of the fimbrial end of the tube. The presence of free blood lying loose in the tubal lumen in this vicinity, and having no histological connexion with blood contained in vessels or spaces of the tubal wall, was not difficult to demonstrate.

In the lumen of the fimbrial end of the Fallopian tube in Case III, a large quantity of fresh blood cells can be seen. There is abundant evidence here of "heaping up" of the epithelium lining the tubal plicæ, but it is not possible to attribute this appearance to an irritant reaction on the part of these cells in response to the presence and contact of the menstrual blood, as it might have been produced by the section passing obliquely through

the plicæ. There is, however, no sign of this lining epithelium being raised up in any part by a collection of blood beneath it—an appearance that would suggest the production of the blood in the tubal lumen by a process analogous to that in the uterine endometrium during menstruation—a condition of Fallopian tube menstruation. I conclude that this blood is derived from the menstrual blood seen in the uterine cavity of this case (Fig. 63) which has traversed the whole length of the Fallopian tube (Fig. 65), and is here seen at its fimbrial end (Fig. 66).

The vessels of the tubal wall are engorged, as is expected during menstruation, but there is no evidence of a process of diapedesis, nor is there any sign of general hæmorrhagic infiltration of the tubal wall.

In Case VIII, the lumen of the Fallopian tube at its fimbrial end exhibits a similar appearance, but not so marked as in Case III (Fig. 67).

The lumen of the fimbrial end of the Fallopian tube in Cases XIX and XX, however, demonstrates the presence of this free menstrual blood to a marked degree. The lack of histological connexion between this blood and blood in the vessels or spaces of the tubal wall or plicæ can well be seen in these cases, the pelvic tumours in both of which were of the Fallopian tube type. Loose epithelial cells can also be observed in the lumina of these Fallopian tubes, and such is the quantity of blood present that my belief is that the cells lining the tubal plicæ are mechanically dislodged from their basement membranes and cast loose into the lumen of the Fallopian tube by the force of this menstrual blood as it is swept along its length.

There is here, again, no evidence to support a belief that this blood is produced from or through the tubal plicæ (Figs. 68 and 69).

The presence of what I believe to be regurgitant menstrual blood is thus demonstrated in the lumen of the fimbrial end of the Fallopian tube in Cases III, VIII (endometrial type), and XIX, XX (Fallopian tube type). In the lumen of the Fallopian tube at its fimbrial end of Case XVII there is a definite and discrete mass of blood and epithelial cells intimately mixed. This blood appears to be old and blood pigment is present in the mass.

This appearance is interesting, as the uterus and appendages, in this case, were removed during an inter-menstrual period, 14 days having elapsed since the termination of the last menstrual period. Except for this one mass of associated blood and epithelial cells, the tubal lumen is clear and its plicæ and lining epithelium appear normal.

Perhaps these blood and cellular elements are the remains of those regurgitated into the tubal lumen during the last menstrua-

tion; failure to escape into the pelvic cavity or to become absorbed or to make their way back to the uterine cavity, accounting for their continued presence in this situation. (Figs. 70 and 71.)

I have cut a number of cross sections of Fallopian tubes as controls in specimens removed for non-inflammatory causes, and in which clamps were applied to the uterine cornu during removal of the uterus, but free blood cannot be demonstrated in the tubal lumen in any of these cases. I therefore regard this appearance as pathological and attribute to it the significance described.

In a monograph entitled "Menstruation and its Disorders," Emil Novak [29], of Johns Hopkins University, deals with the subject of menstruation in great detail and discusses at length the relation of the Fallopian tubes to this phenomenon. He asks the question: "Do they, like the body of the uterus, exhibit certain characteristic changes at the time of menstruation, and do they help in the elimination of the menstrual flow?"

Clinical instances have been described by many in which menstrual blood has been observed to emerge *via* the abdominal ostium of the Fallopian tube—chiefly by Bland[30] and Chapin Minard,[31] who observed the condition in cases of adhesion of the fimbrial end of a tube to an abdominal scar, and inversion of the uterus respectively.

The difficulty of determining the original source of the menstrual blood—whether uterine or Fallopian—from purely clinical evidence is obvious, and moreover, the conditions under which this abnormal menstruation can be observed are such as to render one's conclusions of no practical value owing to the necessarily associated pathological condition of the pelvic organs concerned.

Czyzewicz[32] studied histologically six specimens of Fallopian tubes removed at times related to the menstrual period, and concluded from his study that typical blood-elements are to be found in the lumen of the healthy Fallopian tube during the menstrual period, and not in the inter-menstrual period.

This, of course, does not prove the original source of the blood—uterine, tubal or even abdominal. Czyzewicz, however, showed that the blood-elements found in the Fallopian tube did not emanate from tubal vessels—there being no evidence of rupture of vessels with actual extravasation of blood into the lumen and no definite connexion between the blood in the tubal lumen and that within the vessels themselves.

With regard to the epithelium of the Fallopian tubes, Czyzewicz found no noteworthy changes in his specimens, and states that there is an absence both of cellular degenerative changes and also of any such "heaping up" of the epithelium as would be produced by blood escaping through it.

As a result of his investigations Czyzewicz concludes that the Fallopian tubes do not participate in the process of menstruation, although at the menstrual epochs there occurs a dilatation of the tubal blood vessels similar to that seen throughout the generative tract. He thinks that the blood elements found in the Fallopian tube at the time of menstruation have probably been forced into it by uterine contractions at that time.

The ultimate fate of these elements is uncertain, as he failed to find phagocytes in the Fallopian tube, and he supposes that they make their way back to the uterine cavity.

I therefore conclude, from the histological appearance of the uterine cavity and endometrium, and the lumen of the Fallopian tube in its various portions, in cases of the endometrial and Fallopian tube type of this pelvic tumour removed during menstruation, that the initial stage of the condition, *i.e.*, the primary deposition of endometrial or Fallopian tube epithelium on the surface of the pelvic organs, is brought about (i) in the endometrial type by the passage of endometrial epithelium from the uterine cavity, through the tubal lumen during menstruation, followed by its expulsion *via* the abdominal ostium into the pelvic cavity, and (ii) in the Fallopian tube type by the mechanical dislodgment of Fallopian tube epithelium lining the tubal lumen by the passage over it of regurgitant menstrual blood, and its expulsion into the pelvic cavity in the same way.

NOMENCLATURE.

I enter upon this chapter in some trepidation. The task of applying names to pathological conditions is one for eminent men. In this instance, however, I think that some light may be thrown on the true pathology of this variously named pelvic condition as the result of this work.

Hitherto all recorded cases have been looked upon as possessing the same histological characteristics. There has been no definite attempt to classify them on an etiological and histological basis.

Sampson regards the condition as primary in the ovary, and describes only "The Life History of Ovarian Hæmatomas" (differing considerably from my own observance of the condition as it affects the ovary).

I regard all manifestations of the condition in the pelvis as part of the same tumour, and believe that all, wherever situated, commenced to grow at approximately the same time. A complete life-history of the condition should, therefore, include its varying phases in all affected organs.

Many names have been used to describe tumours consisting of

misplaced glandular or epithelial elements in the pelvic organs, some based upon the etiology, *e.g.*, " salpingitis isthmica nodosa," " adenomyositis tubæ," and " adenomyo-salpingitis," and others upon histological grounds, *e.g.*, " adenomyoma " as the condition is generally called to-day; " endometrioma "—as Blair Bell prefers to call it, and " adenoma "—as Sampson latterly calls it. When these names were decided upon, neither the pathology nor etiology of the condition was definitely known. As Fletcher Shaw says: " The terminology of adenomyoma is expressive enough in our present knowledge of this condition—at anyrate until the etiology is more definitely established." I trust that this is now done and that the pathology is now complete.

On account of the above points I venture to attach a new name to this condition, viz., ECTOPIC MUELLERIANOMA.

No one name of those previously used can thoroughly embrace both the endometrial and Fallopian tube types of this extra-uterine pelvic tumour. " Endometrioma " might refer to the endometrial type alone, but could not, of course, include the Fallopian tube type.

This nomenclature, however, is expressive of both types of the condition as I have classified it—the abnormally situated elements in each case being Müllerian in origin.

I have never found smooth muscle-tissue associated with this tumour in the ovary, and, apparently, neither has Sampson, but its presence—and various authors have reported it in ovaries affected by this condition—does not in any way affect this nomenclature. The tumour itself is only locally malignant and does not tend to the formation of metastases. Its origin, wherever situated, is " from without."

I therefore believe that the most expressive terminology for this pelvic growth is " Ectopic Müllerianoma," and that examples of it are either of the endometrial or Fallopian tube type.

CONCLUSION.

In a certain percentage of women the process of menstruation is abnormal, inasmuch as part of the menstrual blood finds its way into the Fallopian tubes and escapes into the pelvic cavity, carrying with it either endometrial epithelium and stroma cells, or Fallopian tube epithelium.

These elements are deposited upon the surfaces of the various pelvic organs, and in a certain percentage of instances become embedded there and grow into them. They proliferate actively and menstruate concurrently with the uterine endometrium. Misplaced Fallopian tube epithelium reacts definitely to menstruation, but in a lesser degree. It is also not so invasive as endometrial

epithelium. Abnormally situated epithelial elements of these types penetrate into the tissues of the affected organs—the ovary apparently being best suited for their activities—and eventually produce in them tumour formations and excavated cavities containing the products of their menstrual activity. Adhesions are also produced between the various pelvic organs—the whole being responsible for the onset of the clinical symptoms of this most interesting condition.

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TABULATION OF THE MORE IMPORTANT POINTS.

No.	*Clinical History.*	*Gross Pathology.*	*Histology.*	*Remarks.*
Case I.	Age : 45 years. Menstruation : Type 14 to 21 days ; Duration 14 days. Menorrhagia + Dysmenorrhœa + Last pregnancy : 25 years ago. ——— Operation : S.V. hysterectomy c̄ appendages.	Uterus slightly enlarged. Uterine wall contains several small fibroids. The right ovary enlarged and adherent to the uterine body at the site of a small excavation. No evidence of chocolate-coloured fluid blood. The left ovary is not affected.	Figs. 1, 11, 12, 13. The right ovary : invaded by endometrial tissue. The posterior uterine wall : invaded to a depth of ¼ inch by endometrial tissue.	This case demonstrates Stages I and III in the life-history of endometrial invasion of the ovary. No formation of chocolate-coloured fluid blood as yet.
Case II.	Age : 42 years. Menstruation normal. Dysmenorrhœa + pre-menstrual. Menorrhagia + Last pregnancy : 7 yrs. ago. ——— Operation : S.V. hysterectomy c̄ appendages.	Enlargement of uterine body due to small fibroid at fundus. A " nodule " of growth was adherent to the posterior cervical wall. The right ovary exhibited a minute endometrial excavation on its free border ; adherent. Left ovary not affected.	Figs. 3, 4, 31, 35. The right ovary : commencing excavation of ovarian stroma by endometrial tissue. The " nodule " excised was composed of a mixture of fibro-muscular and gland elements of endometrial type. The posterior wall is invaded by a tubular ingrowth of endometrial tissue.	This case shows an example of Stage II in the life-history of this condition. No chocolate-coloured fluid blood formed as yet.
Case III.	Age : 39 years. Menstruation : Type 14 to 21 days. Menorrhagia + Dysmenorrhœa + pre-menstrual. ——— Last pregnancy : 9 yrs. ago. Operation : Panhysterectomy.	Uterus slightly enlarged and adherent to rectum posteriorly. Right ovary densely adherent to broad ligament and contained a small blood cavity. Left ovary non-adherent but exhibits on its surface a small diffuse hæmorrhagic area. Uterine mucosa is hæmorrhagic—menstrual phase.	Figs. 2, 5, 6, 9, 63, 64, 65, 66. The right ovary : active endometrial invasion. The invading tissue is in a state of menstruation. The left ovary : shows a deposit of actively menstruating endometrial tissue on its surface. The Fallopian tube : shows histological evidence of the regurgitation of menstrual blood.	Stages I, II, III are here examplified. The striking feature about this case is the active menstrual condition of the abnormally situated endometrium concurrent with that of the uterine endometrium itself.
Case IV.	Age : 36 years. Menstruation normal. Pregnancies : nil. Dysmenorrhœa : + 1st day. ——— Operation : S.V. hysterectomy c̄ appendages.	Uterus normal. Right ovary excavated and adherent. No chocolate fluid blood. Left ovary non-adherent, but exhibits a few small hæmorrhagic spots on its surface.	Figs. 10, 27, 28, 29, 30. The right ovary : there is active endometrial invasion of this ovary. The uterine wall exhibits a primary deposit of endometrial tissue on its serous surface with commencing invasion of the musculature.	Stage III in the life-history of endometrial invasion of the ovary is shown. The appearance of the primary deposit on the uterine surface definitely proves its mode of origin.
Case V.	Age : 44 years.	Uterus slightly enlarged.	Left ovary exhibits well the stage of	The usual site of excavation is from

	appendages.			
Case V.	Age : 44 years. Menstruation : Type 14 day ; duration 7 days. Menorrhagia + Dysmenorrhœa + premenstrual. Last pregnancy 16 yrs. ago. Operation : S.V. hysterectomy c̄ appendages.	Uterus slightly enlarged. Both ovaries show signs of slight excavation and are adherent.	Left ovary exhibits well the stage of active endometrial invasion from the postero-superior surface.	The usual site of excavation is from the antero-inferior surface. This case therefore differs in this respect —a point which goes to show that any point on the ovarian surface may receive the primary deposit of endometrial elements.
Case VI.	Age : 40 years. Menstruation : Type 21 to 42 days ; duration : 6 days. Dysmenorrhœa + during the flow. Pregnancies : nil. Operation : Panhysterectomy.	Uterus slightly enlarged. Both ovaries normal, non-adherent and unaffected. Thickening due to growth in the posterior cervical wall.	No evidence of endometrial invasion of the ovaries. The posterior uterine wall is typically invaded by endometrial glands and stromal tissue.	This is the only case in which I have seen the uterine body affected from without but the ovaries having escaped. This case negatives Sampson's theory that the ovary is the " primary site " of the tumour.
Case VII.	Age : 36 years. Menstruation normal. Dysmenorrhœa + premenstrual, and not relieved when menstruation is established. Pregnancies nil. Operation : Left salpingo-öophorectomy.	The left ovary exhibits a small chocolate-coloured area on its under surface—2 mm. in diameter. It extends to a depth of 4 mm. into the ovary.	Left ovary : degenerating endometrial gland space situated in a mass of old retained menstrual blood.	Stage IV in the life-history of this tumour.
Case VIII.	Age : 38 years. Menstruation : Type 14 to 42 days. Menorrhagia + Dysmenorrhœa + Last pregnancy 11 yrs. ago. Operation : Panhysterectomy.	Uterus normal. Right ovary : cyst-like cavities apparent on the surface. Left ovary : scattered hæmorrhagic spots on the antero-inferior surface.	Figs. 7, 8, 15, 16, 62, 67. Right ovary : histological evidence of endometrial invasion in Stages II and IV. Active menstrual phase in the misplaced tissue. Fallopian tube : evidence of regurgitation of menstrual blood is observed.	Concurrent menstrual activity of the uterine endometrium and misplaced endometrial tissue in the ovary. Cf. Case III.

No.	Clinical History.	Gross Pathology.	Histology.	Remarks.
Case IX.	Age : 48 years. Menstruation : Type 7 to 14 days ; duration 7 days. Dysmenorrhœa : + 1st two days. Last pregnancy 21 yrs. ago. ——— Operation : S.V. hysterectomy c appendages.	Uterus enlarged—4½ inches in length. The right ovary exhibits on its antero-inferior surface a small chocolate-coloured area. On section a tube-like 'seam' of chocolate-coloured material stretches from the surface to the centre of the ovary. The left ovary is distended to the size of a tangerine orange by extensive endometrial excavation.	Figs. 14, 17, 23, 24. The right ovary : endometrial invasion of the ovary in Stage IV. The left ovary : the last stage in the life-history is here reached. Remnants of degenerating endometrial glandular tissue can be found in the deepest parts of the excavated ovary.	An advanced case. Destruction of the ovaries is practically complete.
Case X.	Age : 22 years. Menstruation normal. Pregnancies nil. Dysmenorrhœa + ——— Operation : S.V. hysterectomy c appendages.	Uterine body enlarged by the presence of a fibroid the size of an orange. From a small area on the surface of the right ovary there exudes, on pressure, a quantity of chocolate-coloured fluid blood.	Figs. C, 18, 21, 22. The right ovary : exhibits endometrial invasion in Stage V.	This ovary shows a good example of the transition stage from the "chocolate seam" invasion of the ovary to the commencement of cavity formation.
Case XI.	Age : 42 years. Menstruation normal. Menorrhagia + ——— Operation : S.V. hysterectomy c appendages.	The left ovary exhibits excavation at its outer pole and on section is seen to be deeply invaded.	Figs. 19, 20. Histological appearance similar to that of the right ovary of Case X.	This ovary shows the process of excavation nearer the surface than the centre (see text).
Case XII.	Age : 45 years Menstruation normal. Dysmenorrhœa nil. Last pregnancy 20 yrs. ago. Complaint : retention of urine. ——— Operation : S.V. hysterectomy c appendages.	Uterus bulky—due to several small fibroids in its walls. The right ovary is converted into a distended sac, the size of a tangerine orange—densely adherent. The left ovary is normal.	Figs. A, 25. The right ovary contains the remains of degenerating endometrial tissue in the deepest parts of the excavation.	This is the largest ovarian blood cavity in which I have been able to discover traces of endometrial tissue. An example of the last stage in the life-history of endometrial invasion of the ovary.

Case XIII.	Age : 31 years. Menstruation : Type 4 to 14 days. Dysmenorrhœa : premenstrual. Pregnancies nil. ——— Operation : S.V. hysterectomy c appendages.	Several small fibroids situated in the uterine wall. The left ovary actively involved and adherent. The fimbria ovarica on the left side was adherent at its tip to the affected ovary. Blood spaces of adenomatous nature can be seen near the surface of the posterior uterine wall.	Figs. 32, 58, 59. The left ovary exhibits endometrial invasion in Stage III. " Contact invasion " of this ovary by Fallopian tube epithelium from the adherent fimbria ovarica. Endometrial invasion of the uterine body of fairly long standing.	This case shows that the epithelial elements of the tubal plicæ are definitely able to penetrate into the ovarian stroma.
Case XIV.	Age : 29 years. Menstruation normal. Constipation + Pregnancies nil. ——— Operation : S.V. hysterectomy c appendages.	Uterus smaller than normal. Both ovaries are enlarged and exhibit scattered hæmorrhagic areas on their surfaces. Both adherent.	Active endometrial penetration into the uterine wall is seen in this case. The misplaced endometrium is in a state of active menstruation. The lumen of the Fallopian tube at its fimbrial end contains free blood elements.	This case also demonstrates the concurrent menstrual activity of the true and abnormally situated endometrium.
Case XV.	Age : 32 years. Menstruation normal. Dysmenorrhœa : premenstrual. Pregnancies nil. ——— Operation : S.V. hysterectomy c appendages.	Uterus normal. Both ovaries distended by extensive excavation and densely adherent.	Figs. 26, 33, 34. The ovaries exhibit the appearance of the last stage in this condition. The posterior uterine wall also shows involvement of long standing.	The endometrial elements in the uterine musculature outlive those which excavated the ovary—a fact which can be understood on account of the difference in menstrual activity between the two; the products of which take such an active part in the destruction of the tissues through whose activity they are produced.
Case XVI.	Age : 43 years. Menstruation normal. Pregnancies nil. Menorrhagia + ——— Operation : S.V. hysterectomy c appendages.	The right ovary shows an excavated area on its inferior surface. The right Fallopian tube exhibits two chocolate-coloured patches on its surface at the fimbrial end.	Figs. 36, 37, 38, 39. The Fallopian tube shows evidence of endometrial invasion from without.	I believe that this is the only case published in which endometrial tissue can definitely be seen to have invaded the tubal wall from without.

No.	*Clinical History.*	*Gross Pathology.*	*Histology.*	*Remarks.*
Case XVII.	Age : 38 years. Menstruation : Type 21 to 35 days. Dysmenorrhœa + Menorrhagia + ——— Operation : S.V. hysterectomy c appendages.	Uterus slightly enlarged. Uterine wall shaggy with light adhesions posteriorly. The right ovary exhibits numerous hæmorrhagic blebs scattered over its surface—varying in colour from red to black. The right ovarian ligament is similarly involved.	Figs. 40, 42, 44, 45, 46, 50, 51, 53, 56, 70, 71. Fallopian tube epithelial invasion of the right ovary and ovarian ligament. Advanced Fallopian tube epithelial invasion of the left ovary.	The distinct differences between this type of epithelial invasion of the ovary and the endometrial type is well exemplified in this case.
Case XVIII.	Age : 38 years. Menstruation normal. Dysmenorrhœa severe. Last pregnancy 15 yrs. ago. ——— Operation : S.V. hysterectomy c appendages.	Uterus slightly enlarged. The right ovary exhibits a general hæmorrhagic appearance on its under surface—adherent. The left ovary is non-adherent but shows an isolated hæmorrhagic bleb on its under surface.	Figs. D, 41, 43, 48, 52, 54, 57. Fallopian tube epithelial invasion of both ovaries.	The left ovary is affected but not adherent.
Case XIX.	Age : 43 years. Menstruation normal. Menorrhagia + Dyemenorrhœa : premenstrual. Last pregnancy 7 years ago. ——— Operation : S.V. hysterectomy c appendages.	Uterus normal. Uterine mucosa hæmorrhagic. The right ovary shows scattered hæmorrhagic blebs on its surface. No blood cavities.	Figs. B, 47, 49, 60, 61, 68. The right ovary shows evidence of active Fallopian tube epithelial invasion in various stages. The Fallopian tube contains free blood elements in its lumen in all parts.	Regurgitation of menstrual blood through the Fallopian tubes can be seen in this case. The relatively slight reaction to menstruation on the part of the misplaced Fallopian tube epithelium can also be observed.
Case XX.	Age : 25 years. Menstruation normal. Dysmenorrhœa severe. Pregnancies nil. ——— Operation : Right salpingo-öophorectomy.	Scattered hæmorrhagic blebs on the surface of the ovary—varying in colour from bright red to black.	Figs. 55, 69. Fallopian tube epithelial invasion of this ovary. Free regurgitant menstrual blood in the lumen of the Fallopian tube.	Another example of the regurgitation of menstrual blood in this condition.

Ectopic Müllerianoma.

CLASSIFICATION.

Endometrial Type.

Etiology.—Endometrial epithelium and stromal cells carried into the Fallopian tubes during menstruation—expelled *via* the abdominal ostium into the pelvic cavity, and deposited onto the surface of the pelvic organs with consequent invasion.

Life History.	*Gross Pathology.*	*Microscopical Appearance.*
Stage I.	Nil.	Primary endometrial deposit on ovarian surface.
Stage II.	(*a*) Minute hæmorrhagic excavation on ovarian surface.	Commencing invasion of ovarian stroma by endometrial elements.
	(*b*) Small diffuse hæmorrhagic bleb on ovarian surface.	Small cyst-like space immediately beneath ovarian surface made by and containing active endometrial tissue. Minute connexion with the surface.
Stage III.	Dark hæmorrhagic erosion and excavation of more extensive nature.	Mass of actively proliferating and invading glands and stroma, penetrating ovarian tissue to some depth (menstruating).
Stage IV.	Chocolate-coloured "seam" extending from surface into the depths of ovary.	Clumps of active endometrial tissue at the deepest part of the old, retained menstrual blood. Immediately surrounded by newly-formed blood. Evidences of glands undergoing early degenerative change and surrounded by old blood in other parts of the chocolate "seam."
Stage V.	Commencing distension of part of the chocolate "seam." Early cavity formation.	Diminution in activity of endometrial tissue found in the deepest parts. Advanced stages of degeneration in other parts.
Stage VI.	Ovary transformed into a distended sac filled with chocolate-coloured fluid blood. The walls of the sac consist of the compressed and thinned-out ovarian stroma.	Traces of endometrial tissue in advanced stages of degeneration in deepest parts of the extensive excavation. Surrounding ovarian stroma deeply infiltrated by old menstrual blood.

Fallopian Type.

Etiology—Epithelium lining tubal lumen mechanically dislodged by force of menstrual blood passing over it—secondary retrograde menstruation—expelled *via* the abdominal ostium into the pelvic cavity and deposited onto the surface of the pelvic organs with consequent invasion.

Gross Appearance.	*Microscopical Appearance.*
Nil.	Primary deposit of Fallopian epithelium on ovarian surface.
Nil.	Commencing invasion of ovarian stroma by Fallopian epithelium.
Small bright or dark red hæmorrhagic bleb on ovarian surface.	Atypical gland-like space lying directly on ovarian stroma and lined by Fallopian tube epithelial cells—situated beneath ovarian surface. May contain blood.
Black or very dark bleb progressing to a depressed scar on ovarian surface.	Dilated, atypical gland-space as in Stage III. Lining epithelium under-degenerative change. Contains old blood.
Diffuse hæmorrhagic erosion of ovarian surface (adherent).	Extensive Fallopian tube epithelial invasion of ovarian surface. No deep penetration but invasion over wide area. Corresponds to Stage III.

Notes on the Formation, Structure and Physiology of the Corpus Luteum of Man, the Pig, and the Duck-Billed Platypus.

By

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Introductory.

Since the discovery of the corpus luteum by Volcherus Coiter in the year 1573, the mammalian physiologist, and especially the gynæcologist have been striving to elucidate the interesting problems this organ presents. Moreover the histologists, and more latterly the cytologists, have entered into a lively discussion as to the precise manner in which the structure becomes formed.

In Belgium, Van der Stricht has studied the intimate structure of the corpus luteum in the bat (Vesperugo) especially; in America, Corner has contributed two important papers on this subject in the pig, while in England, J. P. Hill and O'Donoghue have given some account of the corpus luteum in Marsupialia.

Recently one of us published a paper on a human corpus luteum of ovulation, and in the present communication we propose to extend these observations, and to add some notes on our experiments on the liquor folliculi.

Our material consists of a collection of human, pig and rat corpora lutea. Moreover one of us has recently studied the formation of the corpus luteum of Ornithorhynchus, in conjunction with Professor J. P. Hill, F.R.S,. who has seen some of the preparations of the pig and human corpora lutea which form the basis of the first part of the present paper.

Part I.

There are three views as to the origin of the corpus luteum.

a. That it originates from the theca interna. The upholders of this view are:—von Baer, Valentin, His, Kolliker, Gegenbaur, Paradino, Nagel, Bonnet, Schottländer, Clark, Doering, Bühler, Jankowski, Heger.

b. That it originates from the granulosa or follicle epithelial layer:—Bischoff, Pflüger, Waldeyer, Call and Exner, Schulin, Sobotta, Honoré, Kreis, Sandes, Marshall, Völlker, O'Donoghue, Joka, Borell, J. P. Hill and Gatenby, Solomons, Togari.

c. That it originates both from theca interna and granulosa:—Rabl, Van der Stricht, Seitz, Loeb, Cohn, Meyer, Wallart, Schröder, Marcotty, Reusch, Corner.

The whole question revolves around the fate of the cells of the theca interna.

It can be said immediately that there can be no doubt that the upholders of the theca interna origin, whose names are quoted in paragraph *a*, are mistaken. The evidence brought forward by the observers named in paragraphs *b*, and *c*, is overwhelmingly against the view that the granulosa cells are lost at ovulation or subsequently. The fault lies in the fact that the theca interna theorists have not studied a perfect enough series of corpora lutea.

In all the common animals ordinarily at the disposal of European and American workers the cells of the theca interna and granulosa become much alike in size.

The only animal known to us in which cells of the granulosa and the thecal cells never approach each other in size, is Ornithorhynchus, the Australian duck-billed Platypus. In a paper, now in press, Gatenby and J. P. Hill have reported their observations on this form, and their findings will be referred to below.

We have another line of evidence to bring forward in this paper. One of us showed recently that the so-called silver nitrate techniques, for the Golgi apparatus, had the effect of blackening the theca interna of the human Graafian follicle, and that this argentophility persisted for some time in the corpus luteum of ovulation.

We have since procured more material and are able to add to these previous findings for the human.

Undoubtedly the most satisfactory material we have seen is that of Ornithorhynchus. The sections one of us has studied, in conjunction with Professor J. P. Hill, F.R.S., at once settled the vexed question as to the fate of the theca interna, so far as

concerns this animal. In the duck-billed platypus the theca interna cells increase mitotically before and after ovulation, but do not hypertrophy like the granulosa cells, and take no part in lutein-cell formation.

It is just as well to be clear as to what we mean by this latter statement. There can be no doubt that in supporting or rejecting the mixed origin theory, certain observers have not been clear as to what were the criteria for stating that this or that theca interna cell had or had not become a lutein cell.

By the words "lutein cell" most observers presumably mean a cell containing lutein granules. When, however, we press the question further and enquire what is meant by the term "lutein granule," we find ourselves in difficulties. Modern research seems to have shown that the so-called lutein cells of the corpus may or may not contain neutral and other fats, and that in some of them the lutein granules are merely swollen mitochondria. The criteria for distinguishing by means of intra-cellular granulations between theca interna cells and granulosa cells of the corpus luteum of the larger mammals must at present be vague, because our understanding as to the nature of the lutein granules is itself inconsiderable.

In the duck-billed platypus neither size nor difficulties nor the questions originating from our ignorance of the cell inclusions present themselves; but in the larger mammals, not only do the theca interna cells resemble the granulosa or lutein cells in size, but also the former cells contain osmiophile granules and lutein like inclusions.

In Plate II, fig. 12, we give a microphotograph of the newly ruptured follicle of the duck-billed platypus showing clearly the demarcation between the three layers. This photograph was taken in the Embryology Department of the University College, London, under the direction of Professor J. P. Hill, F.R.S., from material collected, fixed and prepared by him. On the left we have the typical theca externa (T E) formed of connective tissue; at T I, are large groups of theca interna cells, and at M G, are the relatively enormous follicular epithelium, or granulosa cells. The clear space, C A F, is the empty follicle previously occupied by the egg.

At no time in the subsequent history of the corpus luteum of the duck billed platypus do the theca interna cells increase to the size of the granulosa (lutein) cells, so that in the platypus the true lutein cells are purely granulosa in origin.

The vacuoles in the cells of the theca interna noted by J. P. Hill, and previously described in the joint paper of Gatenby and Hill, are well shown at T I, in the middle of the photograph.

So far as the large mammals are concerned, the human, pig, cow, etc. there has been hitherto a real difficulty in following the fate of the theca interna cells. Corner traced the latter cells in the pig corpus, up to a certain stage, but considered thereafter these cells should be looked upon as theca-lutein cells, and consequently that the corpus of the pig was of mixed origin. We believe, nevertheless, that there is a question as to whether this difficulty is due to the inadequacy of Corner's technique. One of us has collected, and prepared pig corpora especially by the Da Fano silver method. In both the pig and the human there are elements in the formed corpus luteum which impregnate markedly with silver. In the human Graafian follicle there are similar argentophile elements, which are to be identified as the theca interna cells. In the pig, however, the same elements in the ripe Graafian follicle are not especially argentophile, and the argentophility of the supposed theca interna elements of the formed corpus of the pig is of later development.

The wall of the human Graafian follicle, in material prepared by Da Fano's method, exhibits four distinct cellular layers, Plate I, fig. 1. The innermost, lining the antrum folliculi, is the membrana granulosa or follicular epithelium, M G. Beneath it is the membrana propria M P, which is now recognized as being a definite cellular layer: it separates the follicular epithelium from the theca interna, which lies beneath the membrana propria. Finally beneath the theca interna lies the fibrous tunica externa, or theca externa.

In Plate I, fig. 1, is a diagram showing these layers. The follicle epithelium of the very large Graafian follicle from which this drawing was made, was found to be about six cells in thickness.

A fact not hitherto noted by previous observers, so far as we know, is that the uppermost layer of the human follicle epithelium is covered by a layer of squamous cells which appear at first sight to be something apart from the ordinary granulosa cells. These cells are shown in Pl. I., fig. 1, at X, but we recognize that they may only be modified follicle epithelial cells.

The follicle cells at this period are somewhat elongated, on the average 10 μ in diameter. The cells of the lowermost layer lying on the membrana propria, M P, are all definitely oriented: their nuclei lie towards the membrana propria, and their small Golgi apparatus away from the latter. This orientation does not apply to the overlying granulosa cells, which are oriented in various directions and not in any special manner. The earliest one-layered follicle epithelium of the young oocyte is arranged in a definitely oriented manner, as is the bottom layer of granulosa cells in the adult follicle. From our knowledge of the part taken by connective

tissues in the orientation of epithelia (A. Drew), we are led to believe that the definite orientation of the lower layer cells of the granulosa is governed by the underlying connective tissue elements.

The typical follicle epithelial cell is drawn in Pl. I, fig. 5. The Golgi apparatus (G) is small and compact, and impregnates very densely in silver. Scattered mitochondria could be made out at M, but in none of our preparations did we discover true fat granules at this stage.

The theca interna layer, as before mentioned, impregnates densely in silver: this is shown in the microphotograph on Pl. II, fig. 10, at T I. In some of these black cells the eccentric nucleus may be distinguished.

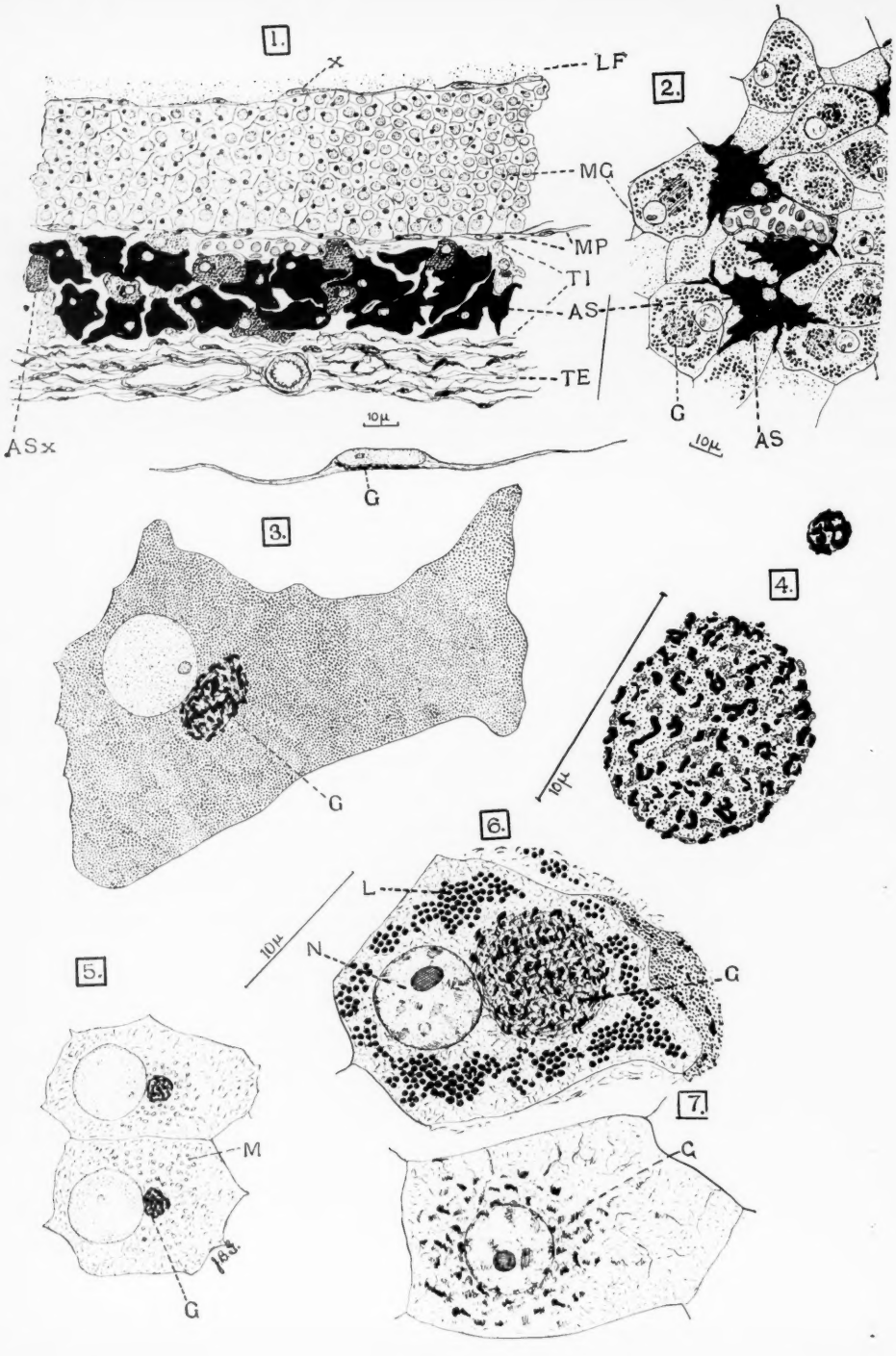
In Pl. I, fig. 1, T I, the theca interna layer is shown: it is formed of irregularly stellate cells, generally with a markedly eccentric nucleus which is small for the large size of the cell. Not all the cells in this layer go quite black by Da Fano's method, some (ASX) are only golden brown, but these are generally among the smaller cells of this layer.

It should be mentioned at this stage that in the large Graafian follicles of the pig, the theca interna cells are, compared with the other cells, much smaller, and in no case at this stage have we managed to impregnate them blackly without at the same time blackening the membrane granulosa. It seems that the pig and human differ in the time of development of the characteristic fixing, impregnating and staining phenomena of the theca interna cells, and also in the relative number of theca interna elements. It is certain that in the pig the latter form a thicker layer and are smaller and more numerous.

Elsewhere one of us has given several microphotographs and a description of a human corpus luteum of ovulation, in which the argentophile theca interna cells were shown to keep their individuality, and on the whole were distinguishable from the true lutein cells. A part of this corpus is drawn in Plate I, fig. 2, the theca interna cells being marked A S, the lutein (granulosa) cells, M G. For photographic confirmation of this argentophility of the theca interna cells of the adult human menstrual corpus, the reader is referred to Plate II, fig. 11 of this paper, T I, being stellate argentophile theca interna cells.

We were anxious to see how Corner's material—the pig, would show by Da Fano's method. To our surprise we have been able to demonstrate that the pig's corpus luteum contains a network of argentophile cells, Pl. II, fig. 8, apparently corresponding to the argentophile cells in the human corpus luteum.

In Pl. II, fig. 9, at a higher power, the same corpus is photographed, the stellate or theca interna cells, being quite black, the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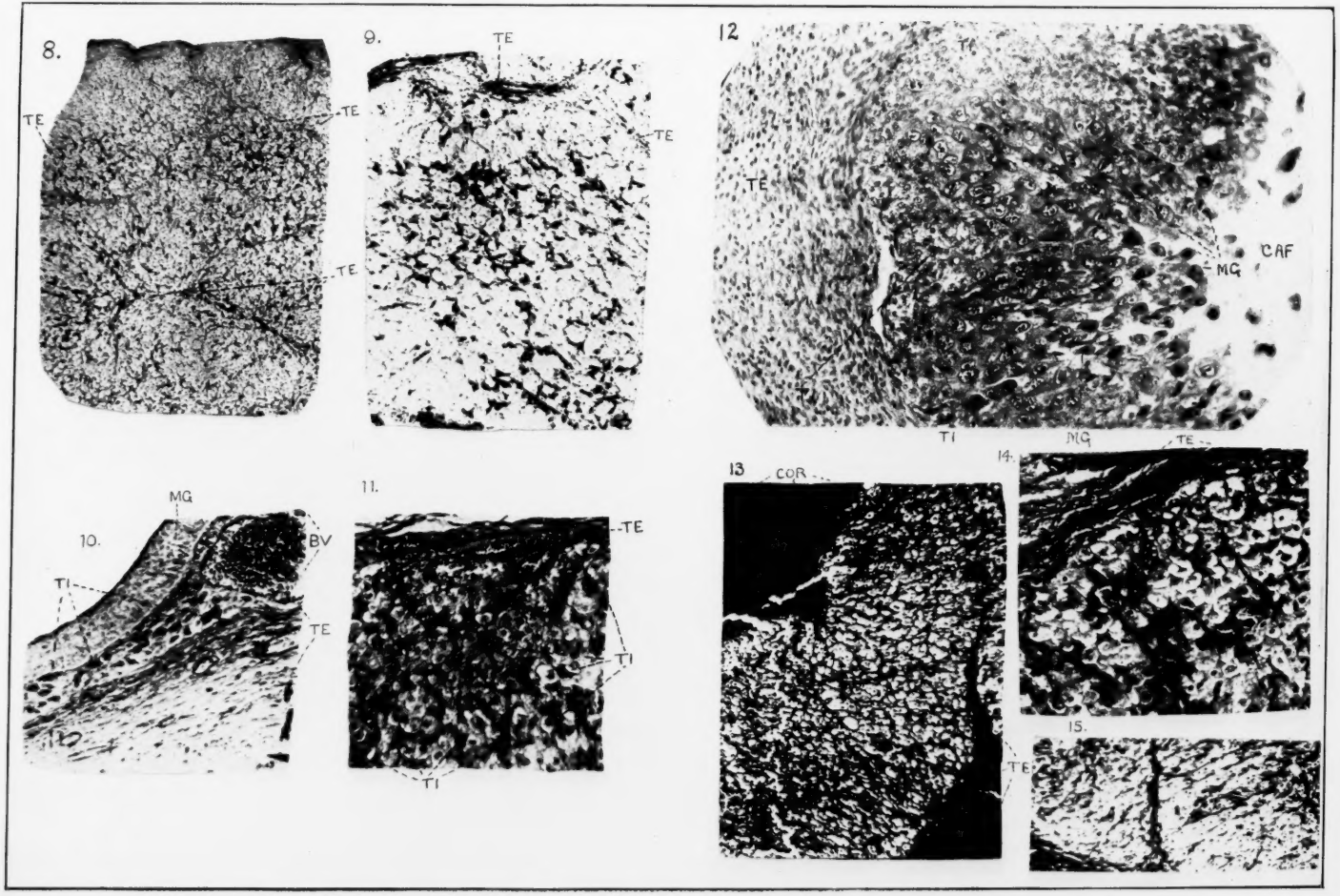
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interstices being occupied by the true luteal cells, unstained. At T E, are theca externa cells.

We suggest therefore that Corner is wrong. In reality, we consider, the theca interna cells keep separate from the lutein cells, and together with the theca externa columns, form the connective tissue matrix of the corpus luteum. These cells therefore are more connective than glandular.

One of us recently obtained a large human corpus luteum of menstruation, one centimetre in diameter. This interesting specimen proved to be regressing; a great development of secondary connective tissue had taken place as shown in Pl. II, fig. 13, and in many places the luteal cells had collapsed completely, fig. 15. Here and there, however, there were less effete regions, and in these we found groups of stellate argentophile cells, fig. 14, which resembled the theca interna cells of the ripe Graafian follicle, in size, shape, nuclear chromophility, and in cytoplasmic argentophility. Consequently we consider that the human theca interna cells keep their individuality up to the time of their final degeneration, and the subsequent formation, by theca externa elements, of the corpus albicans.

The very clear evidence obtained by J. P. Hill and Gatenby for Ornithorhynchus shows that the theca interna cells in this animal do not become glandular in the same sense as the lutein cells. It should be pointed out that the upholders of the mixed origin theory prefer to consider that even though the platypus theca interna cells did not swell visibly, the very presence of these cells not visibly changed and within the corpus proved the mixed origin.

In the platypus the theca interna cells do not take part in the formation of true connective tissue, nor could Hill and Gatenby prove that these cells contained visible rods or granules. Intracellular vacuoles, however, were present.

The idea of Sobotta that the theca interna cells become converted into spindle-shaped cells, and form a connective tissue reticulum cannot be sustained for Ornithorhynchus.

The true connective tissue fibres of the adult platypus corpus, appear throughout to be of the theca externa origin, and there is no evidence that inter- or intra-cellular fibres originate from the theca interna.

Much the same position appears to hold for the larger mammals. The connective tissue proper, that is the true fibrous elements, we consider to be of purely theca externa origin. Corner's endothelial cell origin we doubt very much. This idea has not been sustained by the work of Hill and Gatenby, and is not supported by our own observations on the pig—Corner's material. Then also, the theca interna cells can be traced, as in the platypus, into the full grown

corpus, where they may form a stellate network, but no connective tissue fibres.

It seems to us that the discussions as to "mixed" or "granulosa" origins of the corpus luteum are rather idle. Certainly the theca interna cells take part in forming the corpus luteum : certainly in the larger mammals the stellate or interna cells form a network; certainly these cells may contain osmiophil granules; but we consider that in the human, the pig, and in the platypus, evidence that the theca interna cells produce inter- or intra-cellular fibres has yet to be produced.

The discussions on the histology of this subject at the last resource come down to physiological function. The theca interna cells of the larger mammals contain osmiophile granules, but these appear to preserve their previous characteristics after corpus formation. The real test as to the part played by the theca interna cells in the formation of the corpus luteum is whether they participate in the secretion of some hormone. It may be said at once that our technique does not permit us to answer this question. J. P. Hill, in the work carried out in conjunction with one of us, drew attention to the intracellular vacuoles of the theca interna cells of the platypus corpus luteum : here again it is difficult to say what this means. One might imagine that the theca interna cells could form some secretion at this period, and thereafter remain inactive, and that the subsequent activity of the corpus luteum might be confined to the true lutein cells.

Finally, our view on this subject is that the theca interna cells do not form true connective tissue fibres, and that proof that they participate in the production of a hormone has not been forthcoming.

One of the interesting facts that we have been able to bring out in this paper is the extraordinary change undergone by the Golgi apparatus during the metamorphosis of granular cell into luteal cell; shown in fig. 4 of Plate I. The smaller upper drawing represents the apparatus of the granulosa cell, the lower, the fully grown apparatus of the luteal cell. This remarkable change is shown also in figs. 5 and 6, where the granulosa and luteal cells are drawn to the same scale.

In the later stages of the corpus luteum of pregnancy, and sometimes in that of menstruation, the Golgi apparatus loses its peri-nuclear eccentric position, passes around the nucleus (fig. 7), and partially liquifies, or at least loses its regular arrangement as numerous well defined granules and rods.

PART II.

If the hormone of liquor folliculi is destroyed by the digestive juices, one would expect the same to apply to the giving of corpus luteum extract. One of us has for years used the latter as a therapeutic agent by the mouth with success and without harm. We have recently tried bovine liquor folliculi on many women. It was used in the severe hæmorrhage which is often associated with puberty, in the ordinary menorrhagia (without tumour) of adult women, and in the hæmorrhage of the menopause. It was also tried for menopausal symptoms. In all these the results were absolutely negative. The dose given varied from 1 to 2 ccs. and in some cases was repeated daily for 10 doses. It should be pointed out that the liquor folliculi was given by the mouth, and the active substance may have been destroyed within the alimentary canal. Later, we hope to try the effect of hypodermic administration.

Since glandular extracts became popular, one of us has tried them all. Corpus luteum extract may be used for the non-pregnant and the pregnant woman; in the former it has been prescribed for many conditions; menorrhagia, metrorrhagia; dysmenorrhœa, scanty or absent menstruation; sterility; menstrual epilepsy and the climacteric. For menorrhagia and metrorrhagia corpus luteum in common with other glandular prepartions has been found to have little effect. As this was thought to be reasonable in view of the fact that the retrogression of the corpus luteum means the onset of menstrual bleeding as already stated, cases were tried with doses of bovine liquor folliculi which was collected by one of us, but in no case experimented on so far has there been reaction. In other words in our experience, uterine bleeding, even though it may be hormonic in origin, has not stopped by glandular extracts. Corpus luteum extract has been unsuccessful in most cases of dysmenorrhœa. It was only given when there was no apparent pathological condition present. When successful, it seemed to us that the cases were definitely ovarian dysmenorrhœa, and that it acted probably by directly stimulating the ovary so that the Graafian follicles ruptured through the thickened cortex. It was prescribed in doses of 5 grains three times a day all through the month. Hypodermic administration both intermenstrually and at the time of menstruation has no different effect. For scanty or absent menstruation corpus luteum is a definite specific, and as these conditions are associated with sterility, we must consider them together.

Firstly, scanty menstruation in the unmarried: this is sometimes accompanied by obesity. When the woman is not abnormally stout corpus luteum extract is prescribed. If stout, thyroid extract is given in addition. Moreover, attention to diet is necessary. In

this class of case hypodermic administration of corpus luteum 5 grs. daily for two weeks sometimes has great effect and is quicker in its action than when given by mouth.

Secondly, scanty menstruation in the married: this is almost invariably accompanied by sterility, and in the absence of pelvic disease the results of the administration are startling, are definite, and compare so favourably with the results attained by the use of other glandular extracts that the latter have been discarded. At first sight it is strange to find that corpus luteum extract administered by the mouth should start menstruation, considering its supposed ordinary physiological action, but it is evident that we are dealing with not one but a series of primary and end effects which will only be cleared up after the physiologists have carried out more intensive investigations.

Once menstruation is established properly, a short time only elapses until pregnancy occurs. This does not happen in all cases, but in 75 per cent. of those treated cases in which there was no pelvic or other lesion, and the patient followed out the treatment to the letter (and this must be done) pregnancy resulted. The procedure is as follows:—Corpus luteum (grs. 5 in capsule) is given by the mouth, twice a day for a week, then the dose is increased to one capsule three times a day. At the end of the month this is gradually increased to two, three times a day, *i.e.*, until the patient is getting thirty grains a day. The drug is taken the whole month, including the time of menstruation, and is continued for six months. As pregnancy occurs, or the menstrual flow increases in quality any time during this period, its effect is evidently cumulative. We have already[12] reported a case where a patient, who had never menstruated during three years of married life, commenced to do so after two months dosage. The menstruation continued for two months, then pregnancy occurred. Seven years later she consulted us, as she wished to conceive again. She had never menstruated since the birth of the child. A course of corpus luteum had then the same result, and a second child was born within a year after the re-commencement of its administration.

It is obvious, therefore, that in this type of case the drug is of immense service. The variety used has been manufactured by Parke, Davis and Co.

In the climacteric, when corpus luteum should theoretically be of immense service, we have found it, with few exceptions, of small avail. The old-time medical remedies must still be relied on. There is, however, now on the market a mixed gland preparation which is sometimes useful; it is adreno-ovarian Co. of Harrower, and contains suprarenal gland gr. 1, ovarian substance with corpus luteum grs. 2½, and a little pituitary and thyroid extract. Although

we do not as a rule advise pluri-glandular preparations, this is logical for patients whose symptoms point to affections of the glands mentioned.

There is one other class of case that must be considered. Sometimes young women suffer from fits during menstruation, and at no other time. We have tried corpus luteum in many such cases. Oral administration is useless. In 50 per cent. of our patients, when given hypodermically, cures resulted. It was given three times weekly during the month from the intermenstrual period, and daily during menstruation. The dose prescribed was grs. 3. Ashe has also published cures.

In pregnancy conditions corpus luteum has been found to be of great service, and its chief indication is in the prevention of abortion, miscarriage, and premature birth. When a woman complains of any of these conditions, an exhaustive examination is made to exclude syphilis, etc. In the absence of anything definite, maldevelopment and early retrogression of the corpus luteum may be taken as very possible causes. The administration of 5 grs. daily has a satisfactory result in nearly all cases, provided that the woman takes the precautions which are usually advised in these cases. It is simple to understand why the corpus luteum acts so beneficially in the early cases, but why it should be of benefit in the last three months, *i.e.*, for those who have been in the habit of bearing still-born children, is more difficult to understand. But as mentioned above, we believe that this and parallel phenomena will be satisfactorily elucidated only after more intensive studies have been carried out on the lower mammals.

In the vomiting of pregnancy, both mild and severe, corpus luteum has been used most successfully in many instances, and while not being a specific, it is a very valuable remedy; 5 grs. three times daily is the dose which has been of most benefit. We have also used it hypodermically with good effect as advised by Hirst. Whitridge Williams[13] and others believe that the effect is suggestive, whether or no it obtains cures. There are other vast possibilities open, and we hope later to try its effect in albuminuria, eclampsia and other toxæmias of pregnancy.

Part III.

In view of the results one of us had already obtained with corpus luteum in women, we decided to try the effect of giving liquor folliculi and corpus luteum to rats, and, as has been mentioned above, we tried the effect of bovine liquor folliculi on women.

Our experiments on rats were divided into two sections; in one, normal female rats were given doses of bovine liquor folliculi mixed in oats or condensed milk; in the other rats whose ovaries had been

removed were treated likewise. In both cases controls fed in the same way, but without the liquor folliculi, were used.

Fresh cow ovaries were brought to the laboratory and the liquor aspirated in a syringe. Some Graafian follicles contained as much as 10 cc. of liquor. The bovine liquor folliculi is a brownish straw colour, and when alcohol is added a dense precipitate is thrown down. In the case of the rats we gave the liquor folliculi fresh. It can be kept for a week without going bad by the addition of thymol water.

Our experiments were intended to run parallel with those of Allen and Doisy, only the latter workers had used the injection method, whereas we determined to try feeding experiments.

It should be mentioned that our experiments were carried out in the autumn and early winter, and that none of the rats had bred for two months. The previous summer had been poor, and the general health of the stock was not satisfactory. We do not propose to publish here a detailed account of our investigations: the sum total of our results was to show that in a small proportion of our spayed rats fed on raw liquor folliculi marked sexual feeling was aroused.* Such animals became excited when put with the male and behaved quite differently from the controls. In other cases the results were negative; possibly because the health of the animals was so poor.

Exactly parallel experiments with rats fed with raw corpus luteum gave less definite results, though in a small number of cases the rats became much excited when put with the male. Since our researches are not yet complete, we do not at present propose to lay too much stress on these experiments.

Allen and Doisy believe that corpus luteum injected into rats does not stimulate in the peculiarly marked manner of liquor folliculi applied in the same manner. It is hard to believe this on histological grounds; there is no good cytological evidence for differential secretory activity of the Graafian follicle and the corpus luteum at different periods. The one structure appears to drift smoothly into the other: there is no dropping out of cell areas, only the hypertrophy of pre-existing intracellular structures.

Yet we would wish that Seitz and Allen and Doisy were correct, because the isolation of two such ovarian hormones would be a discovery of great benefit to mankind.

Edgar Allen's investigations especially appear to show that the primary cause of œstrus lies neither in the corpora lutea nor in the interstitial cells, but in the follicles.

Leo Loeb also believes that the first phase of the sexual cycle is

*We also used the vaginal smear methods as well.

dominated by the maturing follicles, and the second by the corpus luteum. Loeb considers that the functions of the corpus luteum so far known are:—1, it sensitizes the uterine wall; 2, indirectly it probably facilitates the fixation of the ovum; 3, it evokes the growth processes of the mammary gland; 4, it helps to regulate the sexual cycle.

Furthermore Loeb considers that the sexual cycle may be divided as follows: 1, the follicular phase, with pro-œstrus, and sometimes metœstrus; 2, ovulation; 3, the lutein phase, including the sensitizing of the uterus.

The climacteric or change of life period marks the termination of the reproductive cycle in a woman's life. At this stage the ovary may be much diminished in size, and the larger Graafian follicles are said to be absent. In the majority of cases Graafian follicles of any size are difficult to discover: there is a marked preponderance of connective tissue and corpora albicantia, and corpora lutea no longer appear.

The work cited in this paper leads us to believe that these changes associated with the menopause which often bring about difficult and dangerous psychic symptoms, might be prevented or at least alleviated by the proper administration of some ovarian hormone, for it is possibly the cutting off of the supply of some ovarian hormones previously derived from follicle or corpus luteum which bring about these physiological and psychological disturbances. This is a matter for the gynæcologist to investigate.

In connection with the possibility of a double set of secretory cells in the corpus luteum, it may be mentioned that the German worker Seitz claimed to have isolated from cow corpora lutea two active principles, one found in the early stages, which, injected subcutaneously, produces the menses in amenorrheic women, and which Seitz calls lipamin, the other a substance which is found in older corpora, called luteo-lipoid, and which acts as an inhibitor of the menstrual function. The first substance, lipamin, stimulates both the internal and external genitalia of mammals and recalls in its effect the liquor folliculi of Allen and Doisy. It might be suggested that the lipamin is found only in early corpora lutea because it is only in early stages that the antrum folliculi still contains the remains of the liquor folliculi, or because the character of the granulosa cells is still predominantly what it was in the Graafian follicle stage.

G. N. Papanicolou has shown that removal of the guinea-pig corpus luteum of ovulation accelerates the appearance of the next ovulation, or, more directly, the corpus luteum maintains or prolongs the interval of time between two ovulations or œstra.

This might be interpreted as experimental confirmation of Seitz's

biochemical work on the corpus luteum, in which he claimed to have isolated a substance, from old corpora lutea, luteo-lipoid, which acted as an inhibitor of the menstrual function.

Thus, in contradiction to Fraenkel's claim, the corpus luteum probably regulates the inter-menstrual period, and does *not* bring about menstruation: it is the loss of power of the corpus luteum, marked cytologically by the inception of regression, that is the first sign of the next menstruation. If pregnancy supervened, the corpus luteum of ovulation becomes the corpus luteum of pregnancy, and goes on producing luteo-lipoid; therefore the embryo or placenta must be able to produce a substance which stirs up the corpus luteum to continued effort, and the production of such a substance by the embryo or placenta only stops some time before parturition. If we can isolate this substance from the embryo or placenta, it should be possible to prevent menstruation in the human female for any desired period.

The above remarks should be read in conjunction with Corner's studies in the sow. Corner finds that during the sexual season there is a general overlapping in the duration of the corpora lutea, and, in any œstrus after the second, there are corpora lutea in an advanced state of degeneration, probably six weeks old, and others in a much more juvenile stage about three weeks old. It might be difficult in such a case to imagine a clear working of luteo-lipoid and lipamine, to use Seitz's terms.

The latest work on the biochemistry of this subject, to which our attention was drawn by Dr. E. Werner, is that of Fraenkel and Mme. Maria Fonda (*Bioch. Z.*, 1923, 141, 379-393). These authors claim to have isolated from the corpus luteum and the placenta, an active principle which promotes sexual development in young dogs. This principle was isolated by distillation in a high vacuum, as a viscous, light yellow syrup. Its formula is given as $C_{32}H_{52}O_2$. Such a substance would appear to resemble Seitz's lipamin.

The work done by Allen and Doisy seems to show that the liquor folliculi contains some hormone which produces a sexual stimulation. If the work on the lower animals applied to human beings, conceive the train of events in the woman to be as follows: —rupture of the Graafian follicle releases the ovum, which is caught by the fimbriated opening, whereas the liquor folliculi is released into the abdominal cavity and absorbed into the blood, producing sexual feeling. Certain authors (*e.g.*, Havelock Ellis*) have endeavoured to show that sex desire rhythm exists in women between the menstrual periods. Whether this is true, and could

* Also M. Stopes.

be made to fit in with the supposed time of absorption into the system of the liquor folliculi, we do not know, and at this stage it would be of little use to enter into the question.

It is a fact that in certain mammals ovulation probably takes place *after* copulation, *e.g.*, rabbit, and probably ferret and cat. If we assume that the breaking of the Graafian follicle, and the release of the hormone in the liquor folliculi are the causative agents of the desire for sexual union, the examples of the rabbit and domestic cat are difficult to explain away: the fact of the matter is that œstrus cycles of various mammals seem to differ fundamentally, and cannot all be explained under one scheme, as certain authors have tried to do.

Conclusions.

1. Examination of the corpora lutea of the human, the pig, the rat, and the duck-billed platypus (Ornithorhynchus) shows that the lutein cells originate purely from the membrana granulosa.

2. The theca interna cells of the pig, human, and duck-billed platypus persist as such until regression sets in (Pl. II., figs. 10, 11, 14).

3. By silver methods the theca interna cells impregnate blackly. The silver can be washed out with alum, and the theca interna cells will then stain blackly in hæmatoxylin (Pl. II., figs. 8, 9).

4. There is no evidence in the human, the pig, or the duck-billed platypus that the theca interna cells form inter- or intra-cellular fibres.

5. The growth of connective tissue in the aging corpus is not from endothelial cells, as suggested by Corner, but from theca externa elements. (Fig. 13).

6. The advisability of adopting the words theca-lutein cells is questioned.

7. The work of Gatenby and Hill on the duck-billed platypus shows that the theca interna cells never approach the granulosa (lutein) cells in size. (Fig. 12).

8. The cytology of the cytoplasmic inclusions of the human Graafian follicle wall, and corpus luteum is described.

9. The work of Allen and Doisy is noted, and parallel experiments with rats, *fed*, instead of injected, with liquor folliculi and corpus luteum, have been carried out. The results, still incomplete, support Allen and Doisy.

10. So far as the experiments have been carried out, bovine liquor folliculi, given to women by the mouth, appears to have no effect on ailments peculiar to women.

11. Corpus luteum is useful when given by the mouth in the treatment of scanty and absent menstruation. It is a valuable aid

to the treatment of sterility, but of little service in the cases of menorrhagia and metrorrhagia. It is occasionally helpful in treating dysmenorrhœa. Menopausal symptoms are seldom relieved. It is successful in some cases of vomiting of pregnancy.

12. Corpus luteum administered hypodermically has cured cases of severe vomiting of pregnancy, and of menstrual epilepsy.

13. It is difficult to understand why corpus luteum administered by mouth or hypodermically should cure amenorrhœa, considering its physiological action. This point requires intensive investigation by the physiologist in combination with the gynæcologist.

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PLATE I.

Fig. 1. Wall of ripe human Graafian follicle. L F, antrum folliculi, containing liquor. M G, membrana granulosa; M P, membrana propria; T I, theca interna with stellate argentophil cells; A S and T E, theca externa.

Fig. 2. Part of menstrual corpus luteum, same scale, same method (Da Fano) to show lutein (granulosa cells, G) and theca interna cells, A S. (Human.)

Fig. 3. Above, a membrana propria cell, below, a theca interna cell. (Human.)

Fig. 4. Above, Golgi apparatus of follicle (granulosa) cell, below, Golgi apparatus of lutein cell, now enormously swollen. (Da Fano.)

Fig. 5. Two granulosa cells, Fig. 6 a lutein cell, and Fig. 7 a lutein cell of a regressing human corpus luteum. (Human, Da Fano.)

PLATE II (Microphotographs).

Fig. 8. Pig corpus luteum, showing theca externa (T E). The larger elements are stellate theca interna cells.

Fig. 9. Same, high power. T E, externa, the dark elements are stellate argentophil interna elements. (Both Da Fano.)

Fig. 10. Ripe human Graafian follicle (compare with Fig. 1). (Da Fano.)

Fig. 11. Human menstrual corpus luteum (compare with Fig. 2).

Fig. 12. Photo by Dr. J. P. Hill of newly-ruptured follicle of platypus showing elements clearly. C A F, follicle cavity; M G, granulosa; T I, theca interna; T E, theca externa.

Figs. 13, 15. Regressing human corpus luteum (menstrual), showing at Fig. 14 remains of stellate argentophil cells (theca interna). Da Fano and iron hæmatoxylin.

Non-Protein Nitrogen and Uric Acid Values in Blood in Pregnancy.*

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The work described in this paper was commenced in February, 1923. It had its origin in some observations made at that time on the amount of uric acid found in the blood of some pregnant women at the later period of pregnancy. Although the values found could not be considered as pathological, yet they were uniformly high. The usual range of uric acid in human blood as determined by the Benedict (1922) method of analysis is 2.0—3.5 mgs. per 100 cc. blood. Our series of determinations ran 3.12, 3.88, 3.40, 3.60, 3.10, 3.80. The lower range of normal values was never found. As possible explanations of our findings, we seemed to have a choice between an increase due to seasonal variation, or connected with the period of gestation. At the time the only observations on uric acid in blood in normal pregnancy were those of Caldwell and Lyle (1921). Their findings lent only very slight support to the increase being due to the period of gestation. The method of analysis used by them, however, is open to criticism in that it is a laborious and tedious process, known to give low results (Benedict, 1915). Consequently it was deemed advisable to carry out a further series of analyses, including also the determinations of the N.P.N.† The observations presented in this paper are :—

(*a*) Average values in normal pregnancy.
(*b*) Values in " toxæmias of later pregnancy."
(*c*) Values in one individual, from the fourth month of pregnancy to labour, under controlled conditions of diet.

In the last case we determined also the urea.

* The thanks of the authors are due to the Medical Research Committee of the University of Toronto for a grant which made this work possible. Miss F. Kelsey is also to be thanked for her painstaking care of patients under our charge.

† Analytical Methods. Non-protein Nitrogen, Folin, O., and H. W. Wu, 1919 Urea, Van Slyke, D. D., and G. E. Cullen, 1914. Uric Acid, Benedict, S. R., 1922. All figures in tables and chart represent mg. per 100 cc. blood.

(*a*) Average Results in Normal Pregnancy.

Our observations are based upon 67 cases of normal pregnancy. At the time of the collection of the blood specimens they were clinically normal, showing normal blood pressure, with absence of œdema, albuminuria, or any subjective symptoms. The patients were examined from time to time throughout their pregnancy, and the finding of any one of the above symptoms was sufficient to exclude the case from our series. This, as a matter of fact, is an unnecessarily severe restriction, as normal figures will be obtained if the pregnancy, up to the point of the taking of the blood specimen, has been normal, although a severe disturbance may develop in the later months. We have not, however, excluded from our list patients in the later periods of pregnancy who gave a history of mild nausea or vomiting in the early period. Such a disturbance, if it be mild, does not affect the values we have been collecting, and even if of a more severe grade, normal figures are obtained on recovery (Harding and Drew, 1924). We have not included, however, any patients with a history of severe and persistent vomiting. A specimen of blood was taken on the patient's appearance at the pre-natal clinic, and none subsequently, except sometimes in labour or post-partum. In this way our results in the later months of pregnancy as contrasted with the early months are not influenced by any change in diet suggested by the clinic to the patient. The specimens were taken late in the afternoon. The results are shown in Table I.

Non-protein Nitrogen.

There can be little doubt that pregnancy is barely distinguishable from the non-pregnant condition as far as values for N.P.N. are concerned. As average figures the N.P.N. is perhaps a little lower than is usual for non-pregnant individuals. The different values that have been obtained, together with the maxima and minima, are given in Table II. Our own average figures differ very little from those of other observers. In Table III are shown average figures for different periods of gestation compared with those of other observers. Preparatory to labour there is a distinct rise in the level of the N.P.N. as compared with the previous months of gestation. Where the sets of observations differ are the figures for the seventh and eighth months of pregnancy. Compared with the early months of gestation we have observed a rise in the N.P.N. This is corroborated slightly by the figures of Caldwell and Lyle (1921), but Williams (1923), and King and Denis (1924) show a distinct drop in the average figures for these months. Williams also determined the values for urea in blood and found a

similar reduction in the average value at this period of pregnancy. The figures then offer contradictory evidence on the course of metabolism at this stage of gestation. The N.P.N. remains high or a little higher during labour, and continues so during the post-partum period. Our figures were obtained ten days post-partum as were those of Williams. All changes, however, are slight, and are quite within what would be accepted as the normal range for the non-pregnant condition.

We wish to draw attention to the fact that it is rare to find a figure of over 30.0 mg. N.P.N. in the early months of pregnancy. None occur in our series except in the winter months with a pregnancy period of 5—6 months, and only one case in the series of King and Denis. In a previous paper this had been stated as a fact without the necessary corroborating figures. A N.P.N. of over 30 mg. was regarded as of pathological value when found in the blood of patients suffering from the vomiting of pregnancy. The finding occasionally of a higher figure need not disturb this conclusion, as apparently it is more likely to occur in the winter months when the incidence of vomiting of pregnancy is at a minimum. The figures of Caldwell and Lyle, however, show many cases with N.P.N. values over 30 mg. per 100 cc.

TABLE I.

Blood Analysis in Normal Pregnancy.

Months, 1—6.			Months, 7—8.			Ante-Partum.			Labour.			Post-Partum.		
Date.	N.P.N.	Uric Acid.	Date.	N.P.N.	Uric Acid.	Date.	N.P.N.	Uric Acid.	Date.	N.P.N.	Uric Acid.	Date.	N.P.N.	Uric Acid.
11.1.24	30.0	3.82	11.1.24	38.7	5.08	19.1.23	28.4	4.6	21.5.23	29.6	3.16	30.1.23	30.0	2.60
18.2.24	34.0	2.94	18.1.24	24.0	3.57	26.1.23	28.0	3.12	21.5.23	24.5	3.64	10.2.23	20.0	2.50
20.2.24	34.2	3.20	31.1.23	26.6	3.40	25.2.24	32.8	3.60	28.5.23	36.7	3.12	25.5.23	33.8	2.96
27.2.24	32.1	3.57	21.1.24	32.0	3.84	12.2.23	26.3	3.88	30.5.23	34.7	2.73	4.6.23	37.8	3.31
29.2.24	28.2	2.76	1.2.24	36.2	3.70	10.5.23	34.7	3.15	30.5.23	28.5	3.24	4.6.23	32.9	2.62
14.3.23	19.8	3.25	1.2.24	31.1	3.30	10.5.23	39.5	3.48	1.6.23	31.3	2.89	25.6.23	27.4	2.86
23.3.23	20.9	2.85	5.2.24	26.5	2.61	17.3.24	26.5	3.53	4.6.23	34.3	3.59	27.6.23	36.2	1.98
23.3.23	25.3	2.12	19.2.23	23.4	3.65	14.5.23	36.7	3.10	15.6.23	30.4	3.90	27.6.23	34.7	2.02
9.4.23	21.4	2.12	22.2.23	27.8	3.10	23.5.23	25.0	2.59	27.6.23	31.0	3.60	9.7.23	32.0	2.66
9.4.23	20.2	2.64	22.2.24	36.8	3.30	7.6.23	32.9	3.29	27.6.23	32.7	4.10	10.7.23	29.4	2.14
10.4.23	27.2	2.28	25.2.24	25.6	3.54				3.7.23	32.4	3.68			
20.4.23	21.8	2.37	26.2.23	32.4	3.80				5.7.23	29.6	3.98			
23.4.23	23.0	1.94	3.3.24	28.8	3.20				7.7.23	28.4	3.44			
21.5.23	30.0	2.15	4.3.24	39.5	3.75				9.7.23	31.2	3.49			
21.5.23	28.0	2.16	3.3.24	21.0	2.78				13.7.23	30.1	3.98			
28.5.23	29.1	2.09	8.3.24	25.2	2.45				14.7.23	38.4	3.80			
28.5.23	26.1	2.35	14.3.24	18.1	3.61				27.7.23	32.4	3.68			
7.6.23	27.0	2.93	17.3.24	26.1	3.48				3.8.23	28.4	3.40			
7.6.23	24.6	2.07	17.3.24	26.4	3.33				3.8.23	38.0	3.10			
			17.3.24	23.0	3.42				12.9.23	46.5	3.17			
			23.4.23	26.0	2.90									
			30.4.23	22.3	2.79									
			30.4.23	24.5	1.88									
			2.5.23	26.0	2.21									
			2.5.23	23.2	2.43									
			4.5.23	28.4	2.52									
			4.5.23	27.2	2.21									
			7.5.23	27.8	2.17									
			7.5.23	31.3	2.25									
			14.5.23	35.7	3.06									
			14.5.23	26.4	2.45									
			16.5.23	32.1	2.51									
			16.5.23	28.6	2.20									
			18.5.23	28.9	3.32									
			23.5.23	24.8	2.96									
			7.6.23	27.4	3.33									
			15.6.23	29.0	3.70									
			22.6.23	24.0	3.80									

TABLE II.

AVERAGE VALUES FOR NON-PROTEIN-NITROGEN.

Author.	No. cases.	Average.	Max.	Min.
Slemons, J. M., and Morriss, W. H. (1916)	35	25.2	—	—
Folin, O. (1917)	100	Rarely over 30 mgm.	—	—
Caldwell, W. S., and Lyle, W. G. (1921)	150	29.69	42.50	18.00
Killian, J. A., and Sherwin, C. P. (1921)	5	24.0	25.00	21.00
De Wesselow, O. L. V. (1922)	13	26.4	30.00	23.00
Williams, E. C. P. (1923)	30 (68 incl. repeat)	25.2	—	—
King, E. L., and Denis, W. (1924)	62	25.1	31.2	20.3
Harding, V. J., K. D. Allin and Van Wyck, H. B.	67	28.0	39.5	19.1

TABLE III.

NON-PROTEIN-NITROGEN.

Average by months of pregnancy.

Author.	Months Pregnant. 1—6	7—8	Ante-partum.	Labour.	Post-partum.
Caldwell and Lyle	(55) 29.19	(83) 29.55	(12) 32.93 (11) 32.13	—	—
Williams	(25) 25.8	(26) 23.6	(19) 26.8	—	(20) 33.6
King & Denis	(17) 25.1	(34) 24.7	(10) 26.1	—	—
Harding, Allin & Van Wyck	(19) 26.6	(38) 27.9	(10) 31.0	(19) 32.4	(10) 31.4

The figures in brackets are the number of determinations.

Uric Acid.

The uric acid in blood in pregnancy is usually accepted as falling within the ordinary limits, except that during labour Slemons and Bogert (1917) noticed an increase, especially in primiparæ. From the figures of Table I it will be noted that there is a distinct rise in the average values progressively throughout the pregnancy and culminating in labour. The figures of Caldwell and

Lyle also show a slightly higher average value in the later months of pregnancy, though one must accept with reservation such low values for uric acid in blood as 0.45, 0.50, etc., as occur in their series. The lowest figure which we ever encountered is 1.88 mg. of uric acid per 100 cc. of blood. The difference is probably to be ascribed to the analytical method. King and Denis in their series of normal cases obtained 1.9 mg. as the lowest value for uric acid in blood in pregnancy. Their series also shows a slight increase in average value as pregnancy progresses.

In order to satisfy ourselves that the figures given as uric acid really represent that substance, we have checked the analytical method against a second one involving a precipitation of uric acid by silver lactate according to the Folin-Wu technique (1919). The values for uric acid when precipitated by silver lactate are lower than the values obtained by the direct colorimetric method of Benedict, nevertheless, they show a similar increase during the later months of gestation, culminating in labour and followed by a drop to lower normal values in the post-partum period. As average figures, however, none range into the pathological.

Seasonal Variation.

In the introduction to this paper we stated as a possibility seasonal variation in the figures for uric acid in the blood. Our average figures for spring and early summer months for this blood constituent were distinctly lower than those obtained in the latter part of winter of the same year. In 1924 we watched again to see if our series of uric acid determinations during January, February and March would run at a higher level comparable with those of the year before. It should be explained that these months are usually the coldest of the year in Toronto, and therefore if any seasonal variation is to be expected it would be natural to find it at that time. Moreover, we had in our mind the question of the seasonal incidence in eclampsia. This is marked in Toronto. It commences in November and reaches a peak about March, being at its lowest during the summer months.

Our figures in Table I are arranged according to the month of pregnancy and the month of the year in which the determination was made. It will be noticed that the higher figures are found both for N.P.N. and uric acid in January, February and March during the pre-natal period. In fact the values in three or four cases would be considered as pathological. Yet all were strictly normal in clinical behaviour. We have collected our averages according to season and period of gestation for the pre-natal period in Table IV. Our figures when divided up in this way become few in number, and conclusions drawn from them are open to a certain amount of

scepticism. Yet it would seem logical to infer both for N.P.N. and uric acid that winter values are higher than summer values. The average figures for uric acid during winter or summer increase with the length of gestation. The N.P.N. during summer follows the same course as our general average figures, whereas in winter there is practically no difference between the different months of pregnancy. One result of this finding of a seasonal variation in N.P.N. and uric acid values would be to afford an explanation of the discrepancy in the N.P.N. figures for the seventh and eighth month of pregnancy alluded to in a previous section of this paper. The difference in the average figures for any month of gestation is not large, and a difference of one sign could easily be changed into a difference of opposite sign by the inclusion or otherwise of a number of results of the same month of pregnancy but taken at a different season of the year. Thus our average figures for N.P.N. show constant increase as pregnancy progresses. Had it happened, however, that we had taken twice the number of determinations during the winter months for the pregnancy period of 1—6 months than we actually did, then the character of our curve would have been changed and we should have obtained a series of averages corresponding exactly to those of Williams. Physiological interpretations of the progress of pregnancy based on averages obtained during that period must then be drawn with caution and only attempted when the possibility of seasonal variation is eliminated. This possibility is excluded when we consider our results for uric acid. Either winter or summer (and all our April, May and June results were taken in one year) the averages go in the same direction.

TABLE IV.

N.P.N. and Uric Acid in Blood in Pregnancy according to Month of Pregnancy and Season.

Month Preg.	No. cases.	Jan., Feb., March.		No. cases.	Apr., May, June.	
		N.P.N.	Uric acid.		N.P.N.	Uric acid.
1—6	8	28.0	2.93	11	25.3	2.28
7—8	19	28.3	3.42	19	27.5	2.62
Antepartum	5	28.4	3.81	5	33.7	3.11

(*b*) N.P.N. and Uric Acid in "Toxæmias of Pregnancy."

In the series of normal cases we have rigidly excluded all those which at any time showed a disturbance such as marked œdema, albuminuria, raised blood-pressure, and those which could be

classified as suffering from some form of "toxæmia," however slight. In many cases the exclusion of the figures of these patients would make no difference to our average results. Slight disturbances of that nature show no effect upon the blood chemistry. When, however, the disturbances become more severe we find increases in the N.P.N. and increases in the uric acid of the blood. The changes which we find in the N.P.N. are irregular; they do not correspond, as far as we can see, with the clinical condition of the patient. Clinically the patient may be in a serious condition without any alteration in the N.P.N. and conversely we have found high N.P.N. without any accompanying clinical disturbance. Plass (1924) has gone so far as to discard all blood determinations of this nature as valueless, and states openly that the older indications of high blood-pressure, retinitis, and albuminuria are of greater value to the clinician than any of the more modern methods of blood chemistry. Certainly it would seem as though this were true, for all attempts to correlate the blood chemistry with either of the two divisions into which the "toxæmias of later pregnancy" are divided, have failed. The attempt of Killian and Sherwin to separate the "hepatic toxæmias" from the "nephritic toxæmias" by means of the ratio of the urea nitrogen to the non-protein-nitrogen has met with no acceptance. Other attempts to find evidence of hepatic disturbance, such as those of Tallermann (1923) and the critical investigation of De Wesselow (1922), have also led to negative conclusions. Attempts to differentiate the "nephritic type of toxæmia" by means of blood chemistry have also been very discouraging in their results. Despite the similarity of the symptoms with glomerulo-nephritis, the parallel between that condition and the "toxæmia of later pregnancy" has not been sustained by an examination of the blood. De Wesselow attempts to bridge this hiatus by introducing a factor of time, stating that the accumulation of nitrogenous products in the blood, which we witness in a nephritis of the N-retention type, is due to their slow method of retention, and that in the more acute condition of "nephritic toxæmia" of pregnancy there is no time for such an accumulation to take place. Moreover, the extent of the lesion is small as judged by the urea concentration test.

We have found, however, in common with other observers, that if the disturbance is at all marked there usually occurs a rise in the uric acid of the blood. Williams (1921) was the first to specifically point this out, and it can be confirmed from the writings of Killian and Sherwin, Caldwell and Lyle, and King and Denis. It is usual to accept a rise in the uric acid of the blood as evidence of failure of kidney function, and we ourselves have used such a method of interpretation in a previous paper, but many times it is a matter of

doubt as to whether a renal dysfunction exists or not. Thus, an increase of uric acid in blood is found in gout and in many cases of skin disease when other evidence of failure of renal function is lacking. In our opinion it would be unwise to attempt to classify a "toxæmia" as essentially nephritic on such evidence as this.

The situation, too, has not been improved by the indiscriminate interchange of the terms urea and N.P.N., when dealing with interpretation of results. Whereas it must be true that a raised urea in the blood must lead to a raised N.P.N., yet such an increase need not be proportional, and a finding of a normal urea value is certainly no guarantee of a normal N.P.N.

In order to illustrate the discrepancies which can occur between the clinical condition and the height of the N.P.N., urea and uric acid in the blood, we cite the following case:—

Mrs. E. T., age 42; viii-para; nine months' pregnant. Admitted to hospital, February 11th, for "toxæmia," and transferred to metabolism ward February 13th. *Symptoms*: headache, œdema, albuminuria, blood-pressure 150/108. Previous pregnancies had also been marked by disturbances of a like nature; five living children; family history unimportant. Patient was placed on diet of 750 cc. milk daily and 50 cc. orange juice with 7 gms. sugar every two hours. Ten per cent. vegetables were added to the diet two days later, and 15 per cent. vegetables two days later again. On this treatment the œdema subsided and the general condition improved. On February 19th the diet was changed to one preponderating in carbohydrate with 3 gms. of salt and containing 1,687 calories. This diet was continued for four days. The patient's condition was at this time extremely good, although albumin was still in the urine and the blood-pressure was still high, the systolic pressure, however, was falling. A nephritic test meal at this time, using the carbohydrate diet as the meal, with 3 gms. of salt, showed a normal response with the exception of a lowered specific gravity at night. There was, however, no nycturia. On February 23rd the amount of salt given was changed to 15 gms., using the same carbohydrate diet. This addition of salt caused a rapid change in the condition of the patient. Œdema developed both in legs and face, headaches, shortness of breath, and eye symptoms supervened. This diet was continued for five days, and again changed back to milk, orange juice and 15 per cent. vegetables. The patient went into labour February 28th.

This patient then shows a toxæmia of the so-called "renal" type as judged by the history and clinical findings, and in Table V is given the blood analysis on the various dates. On the day after admission to the metabolic ward we find a N.P.N. of 100, a normal uric acid and a slightly raised urea N. The ratio of urea N/N.P.N.,

however, is extremely low—16.5 per cent. The dietetic treatment rapidly brought down the N.P.N. until on February 23rd, when the patient was clinically in the best condition, the figures were throughout almost normal. This progress towards normal figures continued when on the high salt intake, and on February 27th all figures are of normal value. It was at this time, however, that the symptoms were most marked, and were certainly more severe than on her entrance to the ward. This case then gives an example, first of all, of mild symptoms of toxæmia with a high N.P.N. and a low urea: clinical improvement with diminishing N.P.N., and finally, more severe symptoms of toxæmia with normal figures.

The high N.P.N. with the normal uric acid and low urea observed at the beginning of this case represent probably the same disturbance as was witnessed in Mrs. Le B. on February 5th and 11th (see report on this case). The figures have apparently no bearing upon the clinical condition of the patient. The renal dysfunction only showed itself when on a high salt intake, and would be classed as of the parenchymatous type, unaccompanied *per se* by nitrogen retention.

TABLE V.

BLOOD ANALYSIS OF MRS. E. T.

Date.	N.P.N.	Uric acid.	Urea N.	Urea N % of N.P.N.	Diet.
Feb. 14	100	3.75	16.5	16.5%	On admission.
„ 18	52.3	4.51	14.5	27.7%	Milk and O.J.
„ 23	35.0	3.8	11.8	30.0%	High carbohydrate: 3 gms. salt.
„ 27	23.5	3.79	10.2	43.4%	Ditto: 15 gms.

DISCUSSION.

In discussing the results which we have presented it is evident that we have obtained a series of figures in normal pregnancy for N.P.N. and uric acid which have very little bearing upon results obtained in pathological conditions of pregnancy. The usual value of establishing a series of physiological figures is to act partly as a base line for pathological values, and in addition to see if such variations as are observed in the normal are capable of physiological interpretation. It must be remembered that our figures have been obtained by a strict elimination of all cases which might, on any grounds, be suspected of being abnormal. The figures of other observers have been obtained in the same way. It follows that should a case be examined whose blood on analysis shows

a marked variation from the usual average in any one of the figures, such a case will be automatically excluded from the final average results, although there might be nothing clinically to justify such an exclusion. We ourselves have occasionally met with cases in which the N.P.N or the uric acid was of a value undoubtedly pathological in character according to the usually accepted standards, and such a case has been excluded from our average tables, although such an action possessed no clinical justification either at the time or afterwards.

The tables of averages which we have presented show, in spite of this elimination, certain changes in the values which certainly possess some physiological significance, although the interpretation may be a matter of doubt. Thus it would appear to be established by all observers who have carried out a sufficient number of determinations and plotted their results according to the month of gestation (although taken as a total average there is very little variation from the normal non-pregnant range of N.P.N. and uric acid) that the average figures tend to be high in the last month of pregnancy when compared with the intermediate months. This would mean that towards the end of a normal pregnancy there is a definite progression towards the pathological, and that possibly, to a minor degree, the question of kidney involvement is concerned. With this we might correlate the established fact that the majority of pregnancies show slight albuminurias, if they are only examined often enough and with sufficient care. We do not, however, definitely wish to commit ourselves to this view. One reason is that we cannot trace a relationship between our normal figures and those obtained in the "toxæmias of pregnancy" in which albuminuria may exist to a high degree, except in the common factor of a raised uric acid in the blood. We have, however, previously stated that we do not consider it inevitable that a raised uric acid in the blood is concomitant with failure of kidney function. Our second reason for hesitancy in drawing the usually accepted conclusions is that we have been able to make a study of the blood chemistry of a normal case of pregnancy from the fourth month onward under varying conditions of diet, and the results have been so surprising that we feel that more experimental work should be carried out in this direction.

(*c*) *N.P.N., Urea N and uric acid values in one individual throughout the period of pregnancy.*

Mrs. Le B., age 30; ii-para. Admitted to the metabolic ward January 11th for observation; no complaints, but had had a little vomiting and had previously been admitted to another ward in the hospital for pain in the left flank and tenseness in left side of

abdomen. This had disappeared with rest in bed. On admission, four to five months pregnant, uterus normal, blood-pressure 110/80, urine negative for albumin and sugar; nervous, respiratory, cardio-vascular and genito-urinary systems normal; Wassermann negative. Family history unimportant; previous history of diphtheria as a child, and operation for mastoid at the age of twenty. Is rather deaf and has defect in speech.

The patient was given diets varying in amounts of fats, protein and carbohydrate, one of the three constituents preponderating so that they are termed high fat, protein, or carbohydrate respectively. During the period of experimental dieting the patient was kept in bed. In intervening periods she was allowed the liberty of the ward. Twenty-four hour urine specimens were collected and records kept of the volume and specific gravity. Total nitrogen and sodium chloride determinations were made during the experimental periods and sometimes in the intervening periods. Blood specimens were taken every four or five days, depending upon the diet and circumstances. Analyses were made for N.P.N., urea, uric acid, sodium chloride and serum proteins. Blood pressure observations were taken frequently, and traces of œdema very carefully noted. The record presented here shows the N.P.N., urea N, and uric acid in the blood. The chlorides are not included as they furnish nothing of value in this connexion. There was never at any time any increase in the blood-pressure nor any significant œdema. Occasionally slight signs of œdema in the ankles could be observed, but they rarely lasted more than twenty-four hours, and usually occurred on high salt intake. Occasionally a trace of albumin was detected in the urine, but as it was not a catheter specimen and never more than a trace was found, the urine was considered normal. Labour occurred normally June 26th. The case, then, from all ordinary clinical signs ran a normal course. The results are shown on the chart.

The most striking feature is an enormous rise in the N.P.N., occurring on February 5th and still present on February 11th. This occurred when the patient was on ordinary diet and had been allowed the liberty of the kitchen. With a N.P.N. of 80 we became alarmed and placed the patient in bed, on a diet of milk and orange juice. There were no symptoms of any kind that could be detected. In spite of the diet the N.P.N. continued high for another six days, reaching a peak of 83 mgs., but three days afterwards it had dropped to a more normal value. Two other small peaks in the N.P.N. are noticeable; they occurred on April 19th and May 31st, after a period of high fat feeding, the one on April 19th being particularly noticeable. In all three of these periods of raised N.P.N. the urea N remains at either its ordinary level or is slightly

depressed, so that we have three distinct periods in this patient's history when the ratio N.P.N/urea N is low, a condition of affairs postulated by Killian and Sherwin as being characteristic of "hepatic toxæmia." Whereas we are unable to explain the cause of the enormous rise of the N.P.N. on February 5th, to some extent it is repeated in the other two periods just mentioned when on the high fat diets. The diets employed to produce this result were slightly below the nutritional requirements of the patient, and produced a definite ketosis, whereas the rise in N.P.N. on February 5th was unaccompanied by any ketosis. The three periods, thus, are not experimentally comparable, yet we do not see that the unexplained rise on February 5th may not be a dietary effect also. It is usually expected that high protein diets will increase the level of the urea N and, consequently, the N.P.N. of the blood. High protein diets were tried during various periods of this patient's stay in the hospital and only on January 26th was a rise in N.P.N. observed. Other periods of high protein feeding hardly raised the level of the N.P.N. above normal values and did not always produce a rise in urea.

In discussing the uric acid content of the blood of this case two very sharp rises may be noticed on April 20th and May 29th. These increases in the uric acid of the blood correspond in point of time to the two increases observed in the N.P.N. when on the high fat diets. We do not wish at this point to discuss the analytical procedure, but we have satisfied ourselves that, at least, these rises in the uric acid represent increases of a substance resembling very closely the analytical reactions of that substance. There is also another slight increase in uric acid to be observed on January 16th. This is scarcely noticeable when compared with the later effects produced, but this occurred also on the high fat diet and there is also a small peak in the N.P.N. at the same date. The uric acid values of April 19th, 21st, and 26th are of distinctly pathological value, as also are those of May 29th and 31st. They are unaccompanied by any clinical manifestations or signs of renal dysfunction. A nephritic test meal performed at this time, and using the high fat diet as the test meal, showed a normal variation in volume and specific gravity during the daytime and ability to concentrate at night. As far as we know this increase in uric acid in the blood brought about by dietary influences is a new observation. Neither high protein feeding nor purine feeding is able to produce the same result. In general, low values for uric acid in the blood were observed on the high protein diets. The lowest values are to be observed on a carbohydrate or protein diet with large amounts of sodium chloride. This case is not an isolated example as we have been able to repeat the results in others, and we propose later to

give an extended account of the experiments. The rise in the uric acid is probably correlated with the observations of Lennox (1924) on the increase found in starvation during the treatment of epileptics. We do not wish it to be understood that these increases in uric acid in the blood observed on our high fat, ketonuria-producing diets are necessarily connected with those observed in "toxæmias of later pregnancy"; ketosis does not usually occur unless those states are accompanied by starvation. If, however, it is possible to produce such alterations by the relatively simple procedure of a dietary change, then an increase of uric acid in blood found in a pathological condition need not necessarily be referred to a pathological kidney.

Conclusions.

The facts recorded in this paper have produced in us a very negative attitude of mind towards the value of the ordinary determinations of N.P.N., urea and uric acid in blood in pregnancy, when made with a view to assisting in the diagnosis or prognosis of the "toxæmias of later pregnancy." It is easy to see, however, how the situation has arisen. Such determinations have been of great value to medicine in the study of nephritis, both from the laboratory and the clinical standpoint. It was only natural to hope that the same determinations would prove of value in "toxæmias of later pregnancy" in which clinical and urinary evidence and autopsy findings oftentimes pointed to renal dysfunction. The increases found, however, in N.P.N. of the blood oftentimes have little or no bearing on the clinical condition as far as we can see at present. They are not always accompanied by increases in the urea, and Plass (1923, 1924) has shown it probable that the increases found in the N.P.N. are confined to the corpuscles. Such increases in N.P.N. are, however, not confined to the pathological. They can, as we have shown, occur in normal pregnancy. It may be objected to that the case we cite as an example of normal pregnancy was not normal, and that we are mistakenly drawing normal conclusions when we should be drawing pathological conclusions. There is, however, no other evidence of a pathological condition. The responses to dietary changes or normal stimuli which occur in pregnancy may have been exaggerated in this case, but we fully believe that careful and continuous observation will reveal other examples. It would appear to be a characteristic of pregnancy to find increases in the N.P.N. without corresponding increases in urea. Myers (1924), in his recent review on the clinical value of blood chemistry has commented on this. In our opinion, very little further advance in this field will be made until the nature of this unknown fraction of nitrogen in the blood is revealed. Normally

it constitutes 50 per cent. of the total N.P.N., but in pregnancy it may form as much as 80 per cent. With such large variations of an unknown substance or substances possible, interpretation becomes a matter of guess work.

There would appear to be a corollary, however, of some positive value. It is common practice in many centres of medicine to place pregnant patients suffering from albuminuria, high blood-pressure or œdema, upon diets in which the protein is severely restricted. Such a restriction, in view of our findings, and in view of the function tests of De Wesselow and Addis (1922), must many times be unnecessary, indeed, if carried to excess, may positively be harmful. Protein is requisite for the growth of the fœtus. If not obtainable from the diet it will inevitably be obtained from the maternal tissues. We do not wish it to be understood, however, that we are advocating an unrestricted protein diet in all such cases. Each should be taken individually without blind adherence to any rule.

Further work along the lines indicated in this paper is in progress, and will be reported at a later date.

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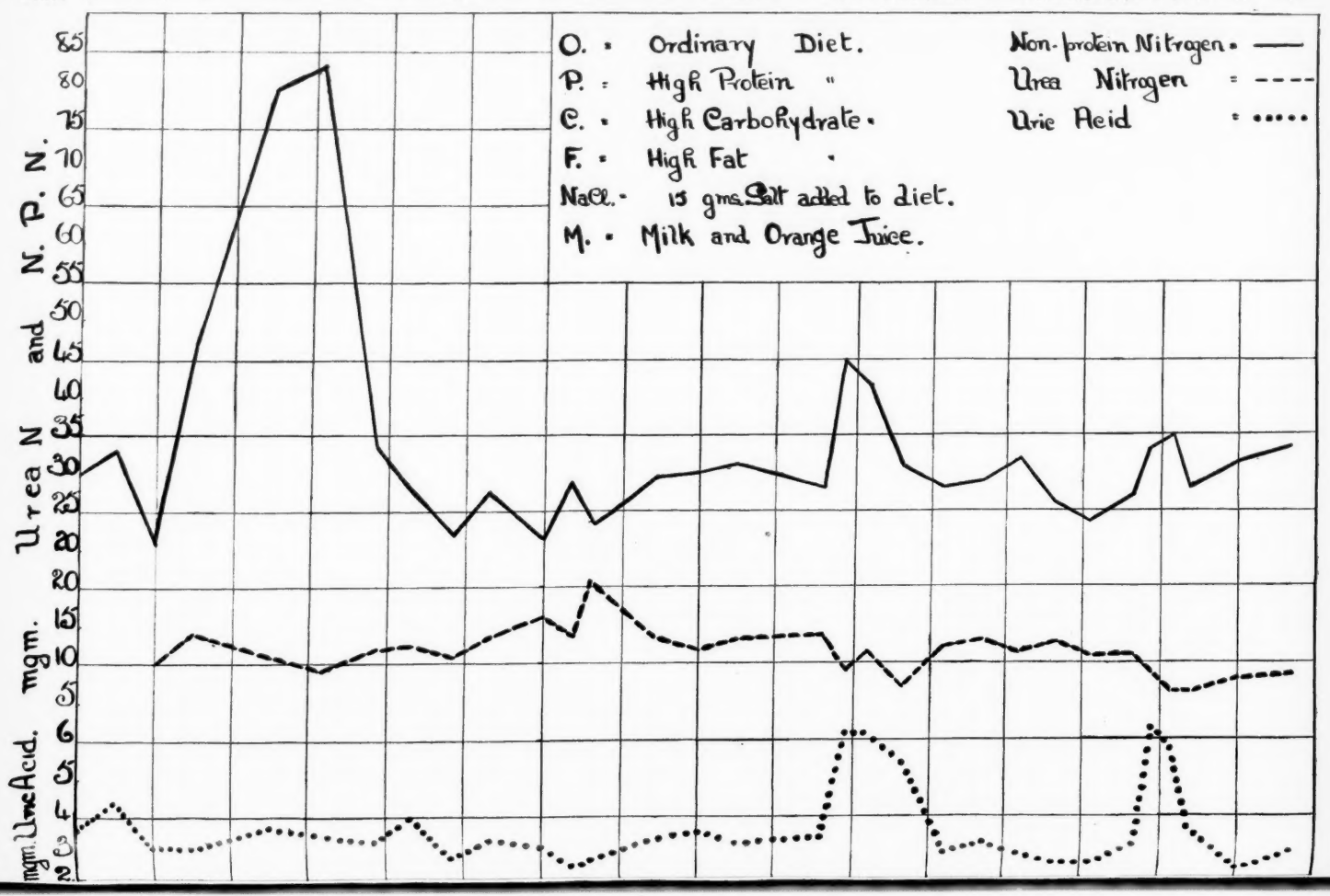
CHART SHEWING VARIATIONS IN N.P.N., UREAN. AND URIC ACID IN A NORMAL PREGNANCY.


DIETS O. F. C. P. O. M. M. C. C. & NaCl. O. P. P. & NaCl. O. P. & P.NaCl. O.F. F. F. & NaCl. P. & NaCl. O. P. & O.NaCl. P. & NaCl. O. F. F.C. O. O.
O. = Ordinary Diet.
P. = High Protein "
C. = High Carbohydrate.
F. = High Fat "
NaCl. = 15 gms. Salt added to diet.
M. = Milk and Orange Juice.
Non-protein Nitrogen = ——
Urea Nitrogen = - - - -
Uric Acid = ...
N. P. N. and Urea N mgm.
mgm. Uric Acid.
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5
6 5 4 3 2

Moulding of the Fœtal Head and its Consequences.

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In the majority of cases moulding of the fœtal head is the last crisis of intrauterine life, and its consequences often furnish the newborn infant with the first of its many mundane troubles. It is true some few experience little of it while others face a crisis earlier in labour or before it begins from the toxæmias, placenta prævia, accidental hæmorrhage and the like, but in the main the above is substantially true. Though this moulding is chiefly a mechanical proposition as far as it concerns mother and fœtus, it by no means suggests it is merely of academic interest; for upon the exact nature of the moulding hang two very important considerations—firstly, the precise character of the consequences to the fœtus (and to a less extent to the mother), and secondly, the conduct and treatment of cases according to the presentation the attendant may find. And as midwifery has ceased to lie in the realm of the haphazard (a reproach which was largely true but a few years ago) the practical value of the present investigations lies in the modification and variation of what the attendant may have to adopt.

The investigations referred to had their inception as a result of the excellent paper by Eardley Holland in this Journal, Winter No. 1922, which dealt fully with the question of tearing of the dural septa of the fœtal brain. Others, notably Capon and Browne, have also directed attention to the subject. There can be no doubt about the great importance of it, for allowing Holland's statistics to be a fair average value, it means that some 50 per cent. of stillbirths are probably to be attributed to tears of the tentorium cerebelli and the falx cerebri and the consequent hæmorrhage. But while we must subscribe to the facts of the tears, the interpretation as to the mechanism of tearing is by no means so clear.

At the beginning it was felt that ordinary freehand drawings, though *apparently* accurate, may still lack the exactitude needed for scientific purposes—they cannot be guaranteed to represent exact measurements to within a few decimal points. Even photographs are not wholly satisfactory. If the fœtus is not stillborn the head rapidly loses its characteristic moulding and there is afterwards no means of verifying any question which may arise for discussion. But it may be both interesting and important to attempt to discover to what limits moulding may proceed without endangering the life of the fœtus. Since we cannot prevent moulding, it must be our final quest to try to modify the distortion and limit it to a safe margin. If these discoveries of torn septa as

the most fertile cause of stillbirth lead to no modification of treatment, then with Ellwood, Milton's quaker friend, we may say, "Thou hast said much here of 'Paradise Lost,' but what hast thou to say of 'Paradise Found'?"

At first (over two years ago) the investigations were directed to ascertaining the exact shape of the fœtal head in the circumference of the suboccipito-bregmatic diameter immediately after birth and about a week later when the moulding had subsided. A narrow ribbon of lead was passed round this circumference, slipped over the occiput and a pencil tracing made. The results, though interesting, were too limited, and the present method was substituted in order to give fuller and more valuable data.[1] It consists in taking a plaster of Paris cast of the head from below the frontal eminences to below the occiput, including thus the whole of the surface subjected to moulding. The first cast is taken at birth, the next a week or so later. The actual technique involved (which is somewhat tedious) is due to Mr. Ernest White, L.D.S., M.R.C.S., whose patience and courtesy were unstinted throughout.

It is obvious the method is not of full use in the stillborn, for we have no demoulded head (or one which has returned to normal shape) from which to take a cast a week later. On the other hand, in the head of a stillborn fœtus in which the septa are torn, we have the evidence that moulding has proceeded further than is compatible with life. But how much further? Perhaps when the number of casts has reached a very large total we may be in a better position to hazard an answer to the question. Recently, after a difficult occipito-posterior delivery, a child for some hours had slight convulsions, twitchings, slight facial palsy and gasping respirations. Clearly, there is every reason to believe this was a borderline case—probably a torn septum with some hæmorrhage, but as the infant recovered perfectly there is no absolute means of verifying it.

Measurements from the casts show some interesting features in the light of which we must modify some of our ideas on moulding. In the drawings reproduced here it ought to be said that all dimensions are exact to within .05 inch as determined and verified by callipers. The black outline is that of a normal fœtal *skull*, the measurements of this being determined and verified as above by callipers. It is to be noted that the black outline does not include the scalp while naturally the casts do include it. But as the thin superposed outline is exactly the same in all and is for comparison only, the difference is not of great moment, and can easily be supplied mentally. In the drawings also the base-line of the cast has been tilted so that on the average this corresponds broadly with the base of the skull.

It may be as well to enquire here into the exact effect of the

1. It may be said, however, that the results of the former method bear out the conclusions arrived at from the series of casts. See later.

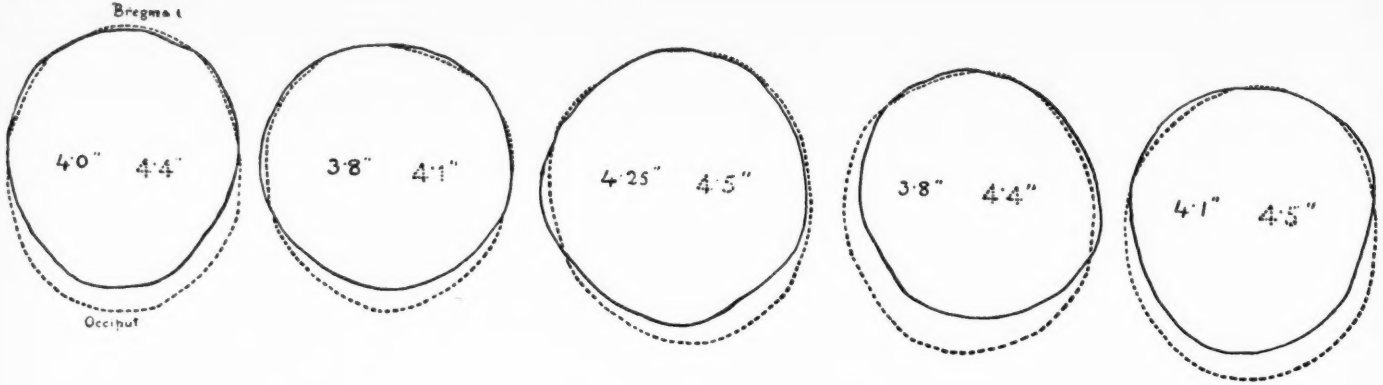


Fig. 3.

Tracings of suboccipito-bregmatic circumferences. Black line, at birth; dotted line, a week later. They confirm conclusions arrived at from the casts that the suboccipito-bregmatic diameter is the one normally shortened and not the antero-posterior. These diameters are given above.

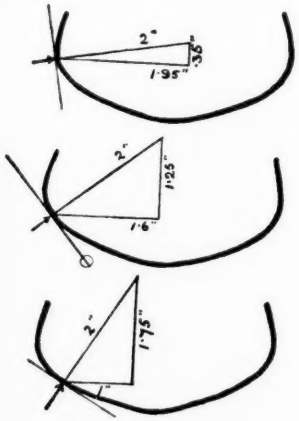


Fig. 1

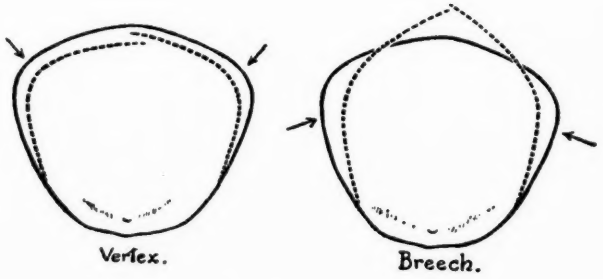


Fig. 2

expulsive forces on the vault of the fœtal skull. Its mobility is well known and may be influenced in a number of ways. In an ordinary vertex presentation the initial stress undoubtedly falls on the parietal bones, and if there be a contracted brim or the head be unduly large the point of contact will be internal to the parietal eminences, *i.e.*, nearer the sagittal suture. The more room there is, absolutely or relatively, the further from the mesial line will be this contact point. As a concrete example, suppose this point falls one-third along the line from parietal eminence to sagittal suture and the brim reacts (at the arrow in Fig. 1) with a force of 2. By the parallelogram of forces the inward or horizontal component, tending to make the parietal bones overlap, is 1, while the vertical component, thrusting the vertex towards the base, is 1.75. If the point falls midway between the former and the parietal eminence the force 2 resolves itself into a horizontal one of 1.6 and a vertical one of 1.25. If almost at the parietal eminences the resolved forces are, horizontal 1.95, vertical .35. These are all shown in the diagrams in inches.

From this consideration it is clear there is no tendency whatever to increase the vertical diameter of the skull. On the contrary, the tendency is to diminish this diameter and to cause overlapping of the two parietal bones. And the smaller the relative size of the brim (and therefore the further from the parietal eminence the contact point will be) the greater the tendency to shorten the vertical diameter of the skull. This is shown in the left-hand sketch of Fig. 2. All this applies when the suboccipito-bregmatic circumference engages in the brim, as it does in the great majority of so-called vertex presentations. In contrast with this the right-hand sketch of Fig. 2 shows the forces acting on the aftercoming head of a breech, and explains how in this case the vertical diameter is increased. Now the suboccipito-bregmatic diameter is far nearer the vertical than the antero-posterior or horizontal, being inclined to the latter at an angle of 60°, and therefore to the vertical one at an angle of 30° (in reality it is nearer 65° than 60°). In order to show this reasoning is not merely theoretical and to consolidate the accuracy of it, a few (taken at random) of the ribbon tracings of the suboccipito-bregmatic circumference already referred to are given here, Fig. 3. They are all of left occipito-anterior or right occipito-anterior presentations, and it will at once be observed that without exception the suboccipito-bregmatic diameter is very appreciably greater a week after birth than immediately after. In seven days' time this cannot be due to growth, but mainly to restitution or demoulding, for in many cases it is as much as ·6 inch.

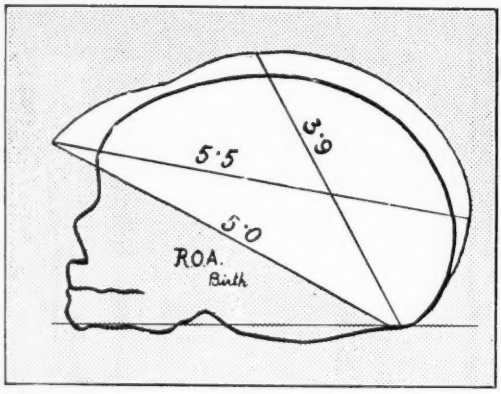
At this point it may be as well to quote from the article by Holland referred to above. On p. 554 he says: "Take a fœtal head, reflect the scalp and remove sufficient of one parietal bone to allow

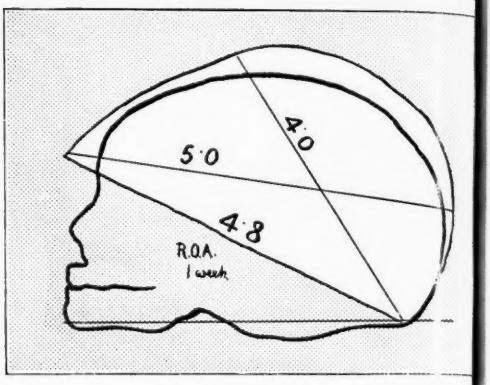
the corresponding cerebral hemisphere to be removed and the septa to be viewed from that side. Now compress the head in the occipito-frontal diameter so that the head is shortened antero-posteriorly by the forward displacement of the occipital bone, and heightened vertically by the elevation and bending of the vault." And a little earlier, p. 553, he says: "Decrease in antero-posterior measurement is brought about by pressure applied at the opposite ends of the diameters lying between the occiput and forehead, *i.e.*, suboccipito-bregmatic, suboccipito-frontal and occipito-frontal; such pressure occurs during labour in vertex presentations and in the aftercoming head in breech presentations, and is correspondingly increased when the pelvis is contracted."

Of the diameters enumerated above, the suboccipito-bregmatic is the one engaged in normal presentations; if it were only occasionally engaged and the remaining ones were the usual diameters involved the statements above might have been allowed to remain unchallenged. But by considering the suboccipito-bregmatic diameter itself we reach the same conclusion as was reached before. For as this diameter is at 60° to the horizontal, if we suppose a force of 2 to be applied at the bregma in the line of the diameter, then the vertical component, tending to flatten the vault, is 1·8, while the horizontal component, tending to lengthen the occipito-frontal, is ·9. As mentioned before, the ribbon tracings given in Fig. 3 confirm our expectations on mechanical grounds. Compression in the occipito-frontal diameter would undoubtedly shorten this, the vault of the skull would rise and the suboccipito-bregmatic diameter be lengthened, exactly as in the illustration given by Holland. The illustration is convincing and apt enough, but it is precisely what does not happen in suboccipito-bregmatic engagements, *i.e.*, it does not happen in the great majority of labours. It can hardly, therefore, be accepted as showing what happens in tearing of the dural septa in normal vertex presentations. We should rather expect a lengthening of the occipito-frontal diameter (*i.e.*, the antero-posterior or horizontal). This is not disputing the fact of the tears of tentorium and falx—unfortunately these are verities enough, but the mechanism is not by vertical elongation of the skull. Other presentations cause this vertical lengthening, but not the suboccipito-bregmatic engagements.

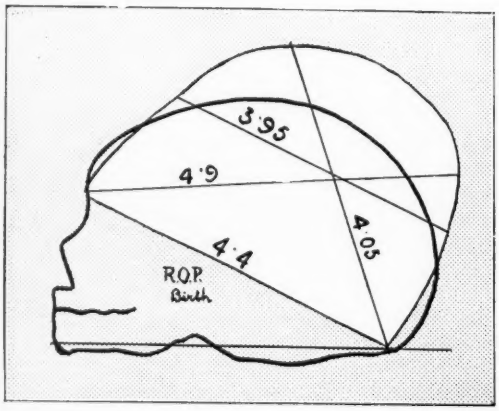
We now come to a consideration of the casts, Fig. 4. Many others might have been shown in the sketches, but as they all exhibit the same features, repetition is unnecessary. Of these, Nos. I, II, IV, and V. began as, or quickly became, occipito-anteriors, while III and VI were persistent occipito-posteriors, both of which, however, were easily rotated late into anterior positions. No. VI exhibited other interesting features, such as posterior asynclitism, but which have no particular bearing on the points under discussion.

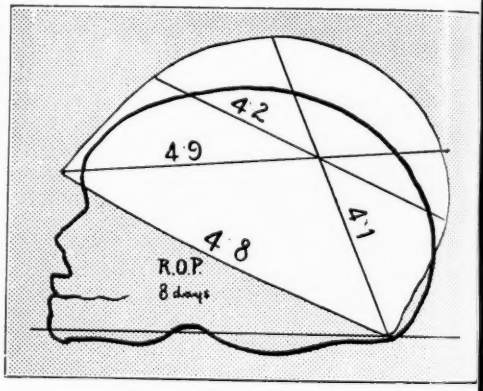
I.


5·5
3·9
5·0
R.O.A.
Birth

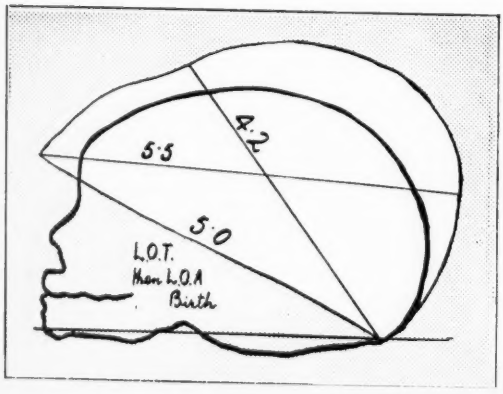

5·0
4·0
4·8
R.O.A.
1 week

III.


3·95
4·9
4·4
4·05
R.O.P.
Birth


4·2
4·9
4·8
4·1
R.O.P.
8 days

V.


5·5
4·2
5·0
L.O.T.
Rhen L.O.A
Birth

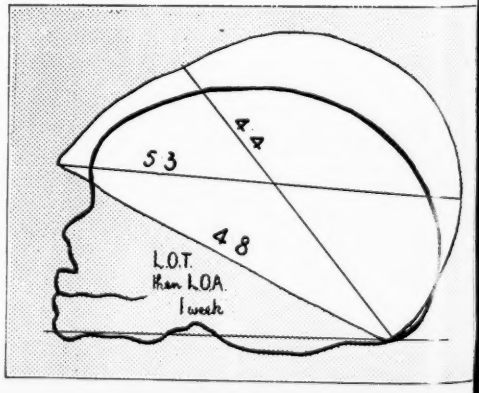
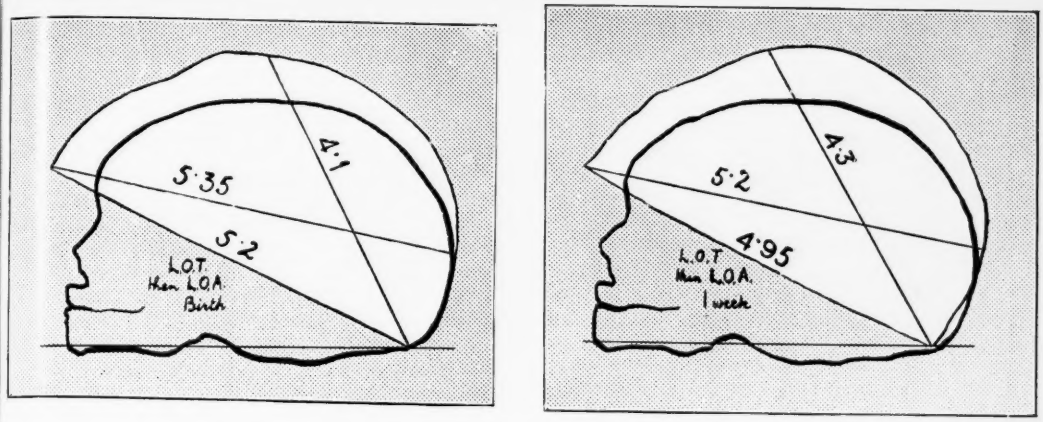
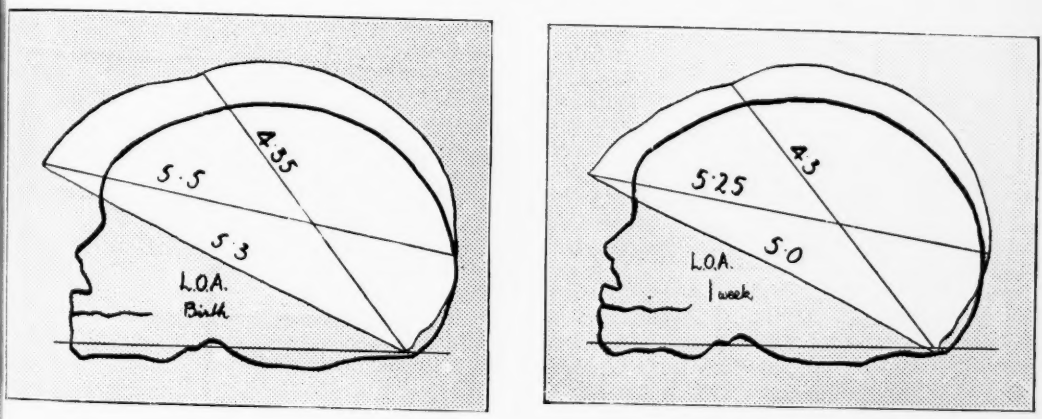

5·3
4·4
4·8
L.O.T.
Rhen L.O.A.
1 week

Fig. 4.

II.


4·1
5·35
5·2
L.O.T.
Mean L.O.A.
Birth
4·3
5·2
4·95
L.O.T.
Mean L.O.A.
1 week

IV.


4·35
5·5
5·3
L.O.A.
Birth
4·3
5·25
5·0
L.O.A.
1 week

VI.

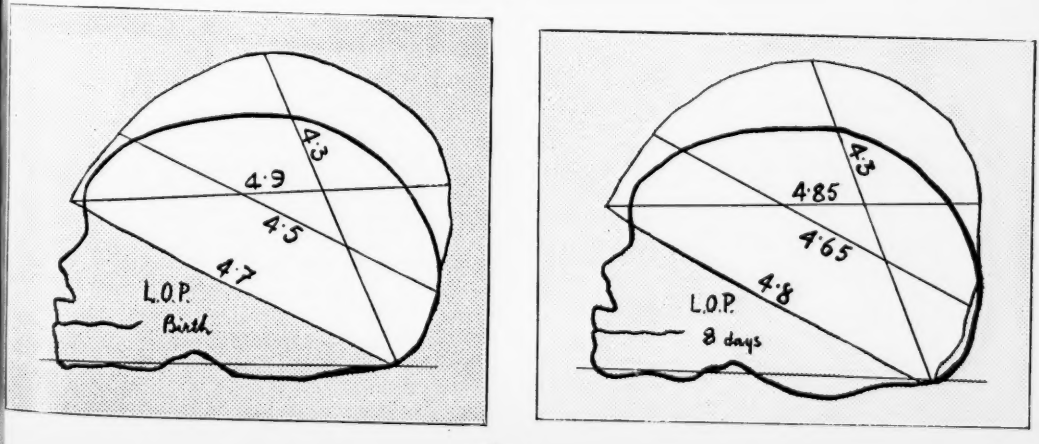

4·3
4·9
4·5
4·7
L.O.P.
Birth
4·3
4·85
4·65
4·8
L.O.P.
8 days

Fig. 4.

Even on a cursory glance the occipito-anteriors are sharply marked off from the occipito-posteriors by the relative *lengthening* of the antero-posterior diameters and the relative *shortening* of the vertical diameters. When the actual measurements are considered the matter is put beyond all question. It will be seen that what may be termed the base-line of each cast is the occipito-frontal diameter, and being inclined at 30° or so to the horizontal, is roughly a horizontal one. The supraoccipito-frontal (usually given in the text-books as the occipito-frontal) is almost exactly horizontal. The remaining diameter in the occipito-anteriors is the suboccipito-bregmatic, or, when it is not exactly this, it approximates more still to the vertical. The following tables show these diameters in better contrast and in the order just given. B is the base-line; S.F. is the supraoccipito- (or occipito-) frontal; S.B. is the sub-occipito-bregmatic.

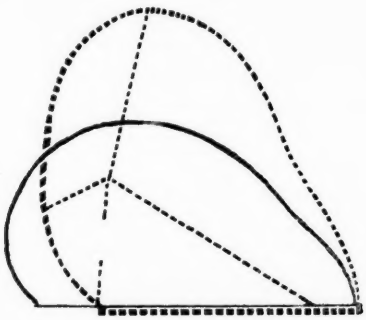
	Birth.	Later.	Difference.		Birth.	Later.	Difference
I.—B.	5.0	4.8	.2	II.—5.2		4.95	.15
S.F.	5.5	5.0	.5	5.35		5.2	.15
S.B.	3.9	4.0	.1	4.1		4.3	.2
IV.—B.	5.3	5.0	.3	V.—5.0		4.8	.2
S.F.	5.5	5.25	.25	5.5		5.3	.2
S.B.	4.35	4.3	.05	4.2		4.4	.2
III.—B.	4.4	4.8	.4	VI.—4.7		4.8	.1
S.F.	4.9	4.9	0	4.9		4.85	.05
S.B.	4.05	4.1	.05	4.3		4.3	0
Horiz.	3.95	4.2	.25	4.5		4.65	.15

In the occipito-posteriors it will be seen one more diameter is given as Horiz., lying parallel to the base-line. This is really a purely arbitrary one and not one usually described, but it has been given to show the plane of maximum moulding in each head in contrast with the occipito-anteriors.

It will be clear at a glance that in I, II, IV, V (*i.e.*, in the occipito-anteriors) the horizontal diameters at birth exceed these diameters when moulding has subsided, the average excess being .244 inch or virtually $\frac{1}{4}$ inch. Similarly the vertical diameters are less at birth than later by an average of .11 inch. On the other hand, in the occipito-posteriors (III and VI) the striking feature is that at birth the diameters Horiz. and B are less than later by an average of .225 inch.

It must now be considered clearly proved that in the majority of vertex presentations, the lengthening of the fœtal head is antero-posterior and not vertical. In order to make it more graphic the accompanying line drawing is given. The black outline is an exact tracing of Fig. 2, II in the paper by Holland above mentioned, and illustrates his view of the vertical elevation of the vault of the skull

by which the falx cerebri and the tentorium cerebelli are drawn up and torn. Superposed is a dotted outline, an exact drawing to scale of one of the casts from an occipito-anterior presentation in which the suboccipito-bregmatic circumference engaged in the brim. It therefore shows without doubt (as also do the others in the series) what actually occurs. As remarked before, it does not question the



fact of the tears, but it shows how the vault is depressed and flattened; the occiput is pushed backwards and the frontal bone forwards. This must result in the whole mass of fibrous tissue round the torcular Herophili pulling backwards the junction of the falx cerebri and the tentorium cerebelli. Just as in a vertical pull, the direction of the straight sinus will be altered, the deep horizontal bands will be over-stretched, and the veins of Galen and their tributaries consequently suffer. On the other hand, it can easily be understood how occipito-posteriors and breech presentations increase the vertical diameters, when the mechanism of tearing suggested by Holland will come into play. In the former, the point of contact with the brim, which normally ought to be at or near the bregma, creeps nearer to the frontal eminences, while the posterior point of contact becomes first the occipital protuberance then supraoccipital as extension is initiated and continued. The line of compression now approximates to and may exactly coincide with the antero-posterior diameter. As this proceeds there will be more and more tendency for vertical elongation of the skull to be produced. The same effect follows in breech cases for a different reason, pressure applied below the parietal eminences pushing these upwards and inwards.

Among the cases analyzed in Holland's paper were 47 breech presentations, and of these 47 no less than 75 per cent. had torn septa. This startlingly high percentage is doubtless due to vertical elongation of the skull. As far as the head itself is concerned, in a breech presentation it is at a mechanical advantage in two ways: *a*, it is a much nearer approximation to a true wedge, entering the

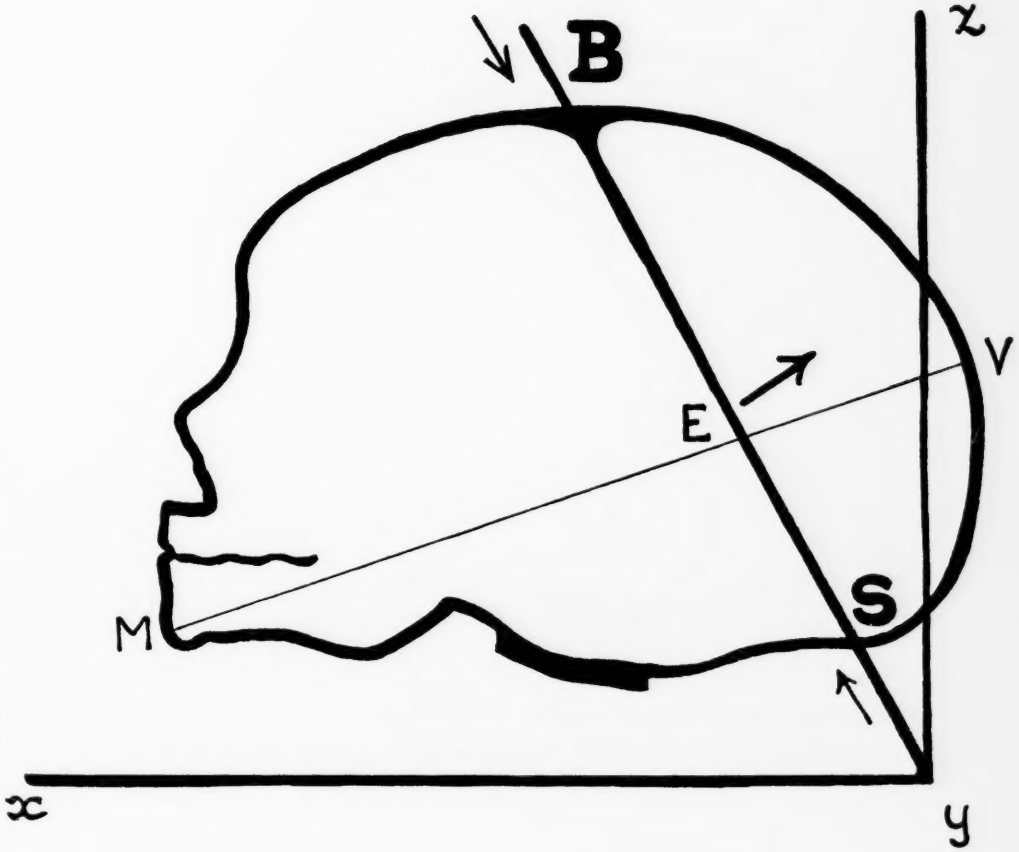


Diagram to illustrate line of greatest compression in a normal vertex presentation. SB is suboccipito-bregmatic diameter. Note this is 60° with horizontal, and not antero-posterior. Arrows at B and S represent compressing force, and elongation is in direction of arrow at E, *i.e.*, nearly in the vertico- (or supra occipito-) mental diameter MV.

brim by its apex end instead of by the base; β, dilatation of the cervix is at least almost complete, and therefore little of the work of dilating falls upon the skull bones. But against these advantages must be set the grave disadvantage that unless the brim is so large as to allow the head to pass without any moulding at all (which is very rarely the case) the first contact begins to produce vertical elongation, and if there be any measure of difficulty the elongation will be extreme and beyond the compatibility with life. Since the elasticity of fibrous tissue is very small its limit will soon be reached; nor would delaying the delivery of the head improve matters, for the septa will rupture whether its elastic limit be reached slowly or quickly. It seems perfectly clear, then, that vertical elongation of the head is the chief causal factor in the tentorial tears of breech presentations. This, however, prompts the question that if vertical elongation is so destructive in breech cases, and there is vertical increase also in normal vertex presentations (as stated and figured in Holland's paper), how comes it that the percentage of tentorial tears is so much smaller in vertex cases? However caused, vertical lengthening of the head has the same potentiality for tearing. But if we admit, as I think now we must, that in the vast majority of vertex presentations—in all in which the suboccipito-bregmatic circumference, or one near it, engages in the brim—the elongation is more antero-posterior than vertical then the discrepancy disappears.

A necessary corollary from the above is that the statement regarding instrumentation must be modified, viz., "the most dangerous direction is when the forceps is applied to the antero-posterior diameter of the head, or to one approximating it." This assumes there is already vertical elongation of the head which would be accentuated by such application. But in the cases now referred to the lengthening is in an antero-posterior direction (the majority of vertex cases) and forceps will prevent any further elongation or even diminish it. Application of the forceps to an already compressed diameter will naturally increase that compression and be to the bad, but in other diameters there must at least be a neutralizing effect and relief of tension on the septa, which will therefore be to the good. A possible exception to this is in applying the forceps to the aftercoming head, when probably elongation will result whatever diameter is compressed. Without a doubt Holland is right when he says instrumentation is often resorted to on the flimsiest grounds, but in many of the cases recorded in his series, being difficult cases, I should be strongly inclined to the opinion that the mischief was caused before the application of the forceps. In any case, however, the profession owes a debt to Holland for his valuable and stimulating paper.

Reverting now to the casts, some other interesting facts emerge

from a close consideration of them. In a majority the bi-parietal diameter at birth is not appreciably greater than the one half an inch below it. This is not usually noted in the text-books, and yet it shows how often the lateral moulding is present but unnoticed.

Some most interesting features are shown in the drawings of two occipito-posteriors taken from behind so that the occiput is seen in the mid-line, the white vertical line passing through it. The black outline is of a normal fœtal skull without scalp, which, however, can be allowed for mentally. The base of the cast is seen to be wider than one would expect, and especially if considered relatively to the bi-parietal diameter. This latter may be said to be moulded out of recognition as such, allowing for the caput succedaneum and the hæmatoma respectively. The former had disappeared within 24 hours, the latter persisted for weeks. By erecting a vertical line through the occipital protuberance the lateral obliquity is not only shown very strikingly, but the amount of the oblique distortion can be accurately measured. Thus in the line of maximum moulding in one cast the semi-diameters are 2 inches and 1·6 inch respectively—a difference of ·4 inch. This gives a deviation from normal of no less than 11·1 per cent. Similarly, in the other case the semi-diameters are 1·5 inch and 1·9 inch respectively—again a difference of ·4 inch. The deviation from normal is here 11·8 per cent. See Fig. 5.

Another point becomes clear on comparing casts taken at birth with corresponding ones taken a week later. In the occipito-anteriors restitution or demoulding of the bones is not only rapid but is fairly complete, while the characteristic moulding of occipito-posteriors has much more tendency to persist, even to leaving its mark permanently on the skull.

Looking at the whole subject in a comparative way it is well known how much easier are the labours among savage peoples. Although the size of the brain (and therefore the containing cranium) is an important factor, still more important is the nature of the enlargement. This is predominantly in the frontal lobes with a consequently higher and steeper frontal region of the skull. In savage nations the suboccipito-bregmatic diameter is, so to speak, ready-made to the most favourable dimensions for parturition. And among civilized nations in which the type of skull is dolichocephalic there is an approximation (in shape) to what may be called the negroid type, and labours on the whole are easier among these peoples. Among the brachycephalics, in which difficulty is commonest, it is a significant fact that the head, as it were, manœuvres itself into such a position as to approximate to the negroid type when the moulding is complete. In a well-marked occipito-anterior case the resemblance is striking. In other words,

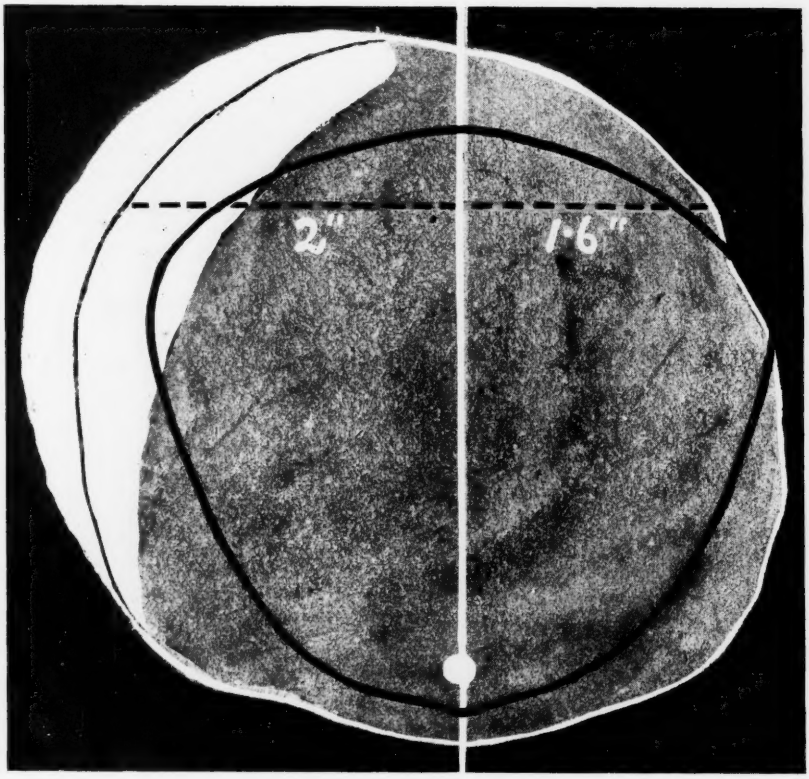


Fig. 5.

Posterior views of two casts of occipito-posterior presentations. Note obliquity, especially of right skull. White spot is occiput. moulding. Semi-diameters

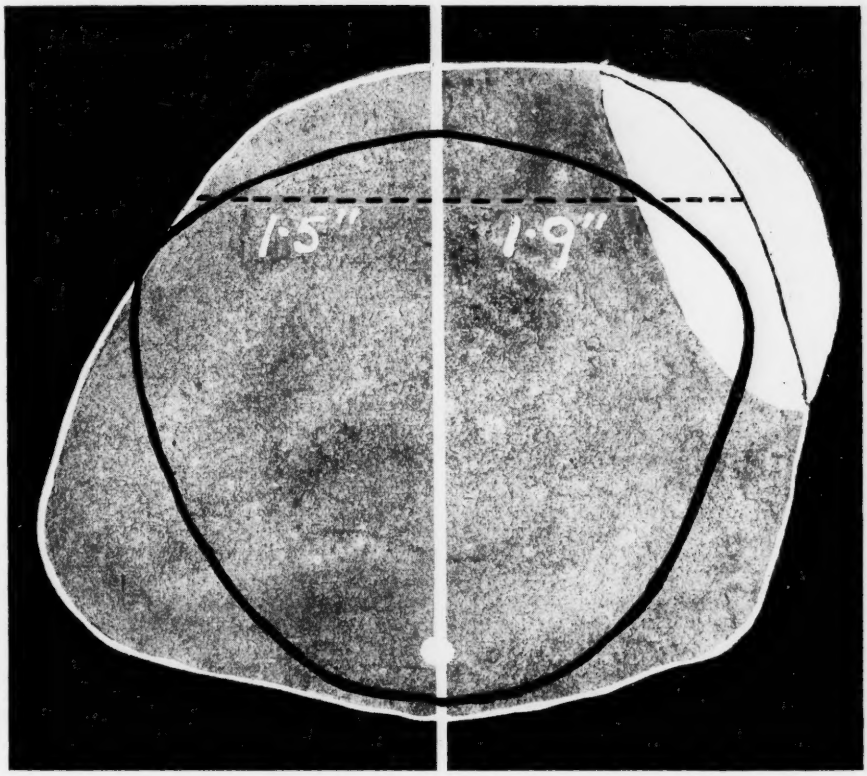


Fig. 5.

Left, a large caput succedaneum. Right, large hæmatoma. The dotted horizontal line is near the point of maximum each differ by .4".

the negroid head is the type at which both nature and art would appear to aim in order to secure an easy labour. And this is certainly an antero-posterior lengthening of the head and not a vertical one. It would appear, therefore, that any deviation from a suboccipito-bregmatic circumference engagement at the brim, however slight, must be regarded as abnormal, even though it be an occipito-anterior position.

Regarding the process of restitution from moulding it is interesting to observe that the normal cases at all events follow a logarithmic curve—that is to say, the demoulding is at first rapid, and later, decreasingly rapid; the amount accomplished in any definite short time always being a fixed fraction of the amount of restitution still needed. Theoretically, therefore, demoulding ought to be continuous throughout life, but consolidation from ossification and growth soon put a limit to the process. And the fact that the grosser abnormalities, such as occipito-posterior and brow presentations do not follow this law, but retain the marks of their moulding, stamps them as deviations from what is intended by nature.

Can any further knowledge as to the mechanism of moulding and its effects be put to any practical use? In other words, if, by noting more accurately the precise part of the head which is presenting and so knowing the exact diameter which is engaging at the brim, will this precision suggest any modification of treatment which will help us to avert some of the stillbirths due to tearing of the dural septa? Reasons have already been given for believing that the application of the forceps in a diameter approaching the antero-posterior will not only be without risk but will even be a means of reducing antero-posterior strain and so lessening the risk of septal tears. Thus, to leave a fœtal head on the perineum hour after hour—as in a case recently under my notice—is only inviting disaster: the child was stillborn. In such a case moulding must have been continuing the whole time, for it is by no means always complete when the brim is successfully negotiated, and the correct treatment would have been episiotomy, and if expulsion did not soon follow, gentle extraction with the forceps. Too long a delay may be as disastrous to the fœtus as too hasty an intervention—in each case it is ill-timed. It is true the application of forceps would appear to carry special risks in brow and occipito-posterior presentations and also in the aftercoming head of a breech, for in every case the vertical elongation already present will be accentuated. If disagreeing with Holland regarding vertical elongation in cases of suboccipito-bregmatic circumference engagement, I most heartily agree that vertical lengthening is peculiarly dangerous when from any cause it occurs. The foregoing is not to be regarded as a valid excuse and plea for the application of the forceps in all suboccipito-bregmatic engagements, for, being the ideal position, these cases

are the likeliest to terminate themselves naturally and without undue danger.

Speaking generally of vertex presentations as a whole, if we could always govern them sufficiently the ideal at which to aim is to secure a well-flexed head, and since occipito-posteriors are nearly always associated with some degree of extension, no means should be spared, before the labour begins, or in its earliest stage, in endeavours to get the occiput forward. This means antenatal supervision, but if, by the use of pads, and therefore the avoidance of internal manipulation, the occiput can be coaxed forward the trouble more than pays for itself. It ought to be mentioned that in not a few of the persistent occipito-posteriors, when the head is now low down and a reasonable time allowance still finds the occiput posterior, the vectis is quite often successful in promoting flexion, when many of them will rotate without further manipulation. Rotation with the vectis should not be attempted. Used only for promoting flexion, the vectis has the advantage of tending to diminish the vertical elongation of the head, whereas the locking of the forceps blades will vertically elongate still more.

But the most serious menace is the breech presentation. It is common experience that the mortality is high, and Holland and others have shown how large a percentage of the stillborn fœtuses have torn septa. Until recently the high mortality was very largely attributed to pressure on the cord and arrest of fœtal circulation, but if this were the main cause we might expect more recoveries from resuscitative treatment. Whether or not this is a legitimate suggestion it must be accepted as proved that the bulk of fatalities must now be put to the account of torn septa. To pull on the limbs in a breech undoubtedly often initiates, and always increases, vertical elongation of the head. It is such a temptation to use what appears to be a means specially provided to expedite delivery—the temptation must be refused. The real value of pressure on the head from above acquires a new significance : it is not merely the pressure but the promoting and maintaining of flexion in order that the suboccipito-bregmatic circumference (or one near to it) shall be engaged in the brim. Seen in this aspect, no matter what the presentation may be (except transverse lies, etc.), one simple aim would appear to govern all treatment, viz., if possible, secure and maintain flexion of the head. And in view of the dangers of breech presentations it becomes a question to consider very seriously whether in all of them we ought not to attempt external version before labour begins and allow the fœtus to start its journey in a vertex position. This again implies the supervision of all pregnancies, at the very least during the later months. If, during this supervision and routine examination, a breech is found,

external version ought to be performed from the 34th to the 36th week. The majority can be turned quite easily, and in the worst event the result will simply be a failure to turn. By this means it seems likely we ought to save, say, 75 per cent. of the stillbirths at present due to breech presentation. It is assumed, of course, that definite contra-indications to a vertex presentation—marked pelvic contraction, hydrocephalus, etc.—have been eliminated during the examination and the appropriate course of action decided upon in each case. In the light of Holland's findings it seems scarcely worth while criticizing Potter's advocacy of almost routine version of cephalic to breech presentations. His own statistics are certainly remarkable, but such good fortune, combined doubtless with a particularly apt skill and considerable self-restraint in the last stages of delivery, could not be expected to fall to the lot of the majority.

There is nothing new in turning a breech to a cephalic presentation, and it has long been known that the ideal circumference of engagement in a vertex is the suboccipito-bregmatic, but the knowledge of the frequency of dural tears invests the suggestions above with much more imperativeness than a mere opinion. It is a stricter application of old knowledge, the whole philosophy being—turn a breech to a vertex; in every vertex (and breech too if version prove to be impossible) promote by every known means extreme flexion of the head.

It may be opportune to offer a remark about artificial respiration. If we are sure in any instance that a dural tear and hæmorrhage were responsible for the asphyxia threatening an infant it is certainly better to leave it severely alone, and especially not to use those methods involving violent movements. Thus Schultze's method is very effective in some cases, but it is the last one would use if a septal tear were known to be present or even probable. So, too, good though Marshall Hall's method be, the head is totally unsupported and the same objection applies. Byrd's method is much gentler but not so effective. For these reasons I described a method in the *Lancet* (May 7, 1921) which has not these objections; the child can be completely wrapped in a warm blanket, and the method is much more effective than the others. One great merit is that the movements may be executed so slowly and gently that there is no risk whatsoever—violence is entirely eliminated. In suitable cases, however, the movements may be more vigorous.

As these investigations have prompted some interesting suggestions it has been thought worth while to record them. In doing so I wish to acknowledge gratefully the help accorded me throughout by Sister Hamilton Watts, R.R.C., who has assisted me in the taking of every cast, and that of Mr. White, who devised the best method of doing so.

Some Observations on Seventy Years of Country Midwifery Practice.[1]

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This communication has three objectives in view. First, to examine the statement frequently made and supported by statistics, that puerperal mortality is as high to-day as it was seventy years ago; second, to question the opinion, also widely held, that the bulk of this mortality is the result of instrumental and other interference with the course of labour; and third, to suggest that this matter of puerperal mortality might profitably be examined from a somewhat new standpoint to which I will finally direct your attention.

The material from which any conclusions arrived at are drawn is the experience gained in a mixed small town and country practice from the end of "the forties" till the present day, of cases in all classes of society, from those in the country houses around to the tramps in the lodging-houses. Needless to say they are not the experience of one man. But they cover a period of obstetric history of more importance than any (if we except that of the epoch-making invention of the Chamberlen forceps), a period which began before chloroform was generally used in obstetrics, before Oliver Wendell Holmes' pronouncement had taken the ear of Europe, and when antiseptics were undreamed of. They fall naturally into three series, one embracing the "fifties" and a little more; another beginning with my early days from 1880 into the "nineties"; and the rest up to a recent period. I shall give you the figures upon which the positions I wish to take up are based; I shall then describe the development of our science in one or two directions; and, finally, shall lead up to my main endeavour, namely, to establish the rule that the parous woman, *ipso facto*, is apt to die.

I.

Now, as regards the statement that the mortality of to-day is no better than that of old times, hear the two following pronouncements. Ewan J. Maclean[1] says: "Taking a quinquennial period of seventy years ago, the puerperal death-rate from all causes was 4.9 per 1,000, as compared with 4.2 sixteen years ago, and deaths from puerperal fever account for 50 per cent. of them."

1 A paper read at the Edinburgh Obstetrical Society.

F. M. Haultain [2] says: "The mortality from puerperal causes in Scotland is as high as it was fifty years ago, viz., about 5 per 1,000, or 1 in 200 cases." But, before we take statements such as these at their face value, we might usefully consider the authority on which they are based—that is, the parish registers of the time. Registration in its present form was hardly known. In England, indeed, while there had been church registers since the middle of the sixteenth century, the State only took over the business of registration of births and deaths in 1836, and it was not until 1874 that either became compulsory. In Scotland, the corresponding date was 1854, and we may be sure that anything like accuracy would be the growth of some years at the very least.

Be that as it may, I have some figures in my possession which tend to show that the belief that the maternal mortality was as low then as now is erroneous, and that, on the contrary, it was considerably higher. I have the midwifery case-book of my predecessor in this practice, a practice taking in all kinds of patients, principally the wives of agricultural workers, a strong, healthy body of women, with practically never a rickety pelvis. He and his brother were in practice together from the end of 1847 to 1864, when the book ends. There are in it the names of 936 cases. Of these only 60 or 70 per cent. required interference, so that 93 per cent. were normal cases. The abnormal cases are shown in the Table. They correspond in frequency very much as at present, but have some points of difference which bear on the subject-matter of this paper. Thus, we note that they are very "modern" in three respects, the low proportion of the forceps cases, only 21 in the whole series, or in 44, or 2.2 per cent., the small number of versions, only two, both for placenta prævia, and the practice of craniotomy. There is a very large proportion, 93 per cent., in which no operative interference is reported; and lastly, and most importantly, there is a very high maternal mortality in which four-fifths of the cases were non-operative. Twenty maternal deaths in 936 cases means a mortality of 21 per 1,000. In only four of these deaths is any operative action noted—one in a forceps delivery, one in a breech delivery, one a case of twins, and one with a retained placenta, the patient dying on the 24th day, probably from sepsis. In the other 16 cases no operation was reported, and we may infer that the patients died either from sepsis, or what was much more common in those days, from exhaustion in a day or two. We are accustomed to read of such cases even in the general literature of the period. It is needless to say how accurate an observer was Charles Dickens, and the death of Mrs. Dombey is probably typical of many cases of the time. But from whatever cause, twenty mothers died in this practice in sixteen years. This is so much at

variance with modern experience that I approached the Registrar-General for Scotland, giving him the names and addresses and dates. He very kindly had a search made for me, and though unable to trace my cases, he gave me names of eleven other women who had died in child-bed in Cupar in the years from 1847 to 1854. These may be taken as having occurred in the practices of the other doctors and midwives in Cupar at the time, and they go to confirm the impression that at that time there was a considerably higher mortality among women than at the present day.

To form a correct appreciation of the situation in those years we should have a clear idea of the state of knowledge and the rules of practice laid down by teachers at that time. Take, for example, the *Practical Observations* of James Hamilton, Professor of Midwifery in Edinburgh, published in 1836. It is true that my predecessors qualified in 1845 and 1848; but James Y. Simpson had only recently succeeded Hamilton in the Chair; they were students of the College, not of the University; and I know of no work published after Hamilton that would be likely to have been an authority to them. Hamilton's teaching was then dominant. Let us see of what it consisted.

A tedious first stage was treated by venesection in the first instance, followed by "an opiate enema"; if this did not suffice, the os was dilated manually. The second stage was mainly concerned with support of the perineum, for hours if need be—he mentions having done this for twelve hours without leaving the patient—and "fine lard," to the extent of a pound for a case, was used to lubricate the passage. The third stage was a still more extraordinary performance. You felt along the cord till you could reach the centre of the placenta, and if this could be done it was ready for extraction. Twisting the cord round the fingers of the right hand you pulled on it till it came away, again supporting the perineum with the left hand. If the placenta were retained for more than an hour it should be removed. (This appears to be an innovation on the practice of leaving it for a long time.) If adherent, the placenta is to be grasped by the examining hand, and "pressure is now to be made upon its substance, bringing its circumference towards its centre and detaching leisurely and carefully all that can be separated by this manipulation. The separated mass is to be extracted by pulling with the navel string."[3]

Simpson's teaching, it may be observed, is very similar.[4]

When we come to discuss the "forceps question," I shall have to quote again from this interesting writer; but we may reasonably say that a system which deals with its tedious cases, not by operation but by venesection, opiate enemata, and manual dilatation without

antiseptic precautions; that lubricates the passages with "fine lard"; and that pulls out all its placentæ by the "navel string" and removes adherent placentæ by pulling at the centre in a "leisurely" manner, is not a system from which we could expect results comparable with those of modern methods.

I now put beside this series another of cases occurring in the same area, which series I shall presently divide into two. These fell during the year 1880, when I began practice in Cupar, till 1923, and comprise 2,200 cases in approximately 1,600 women. Of these cases 557 were abnormal in some way, being 26 per cent., leaving 74 per cent. of "normal" cases. The abnormalities were as follows: Forceps cases 393, being 18 per cent., or 1 in 5.5; twins, 8, or 1 in 78; pelvic and cross-births 35, or 1 in 62; placenta prævia 15, or 1 in 146; post-partum hæmorrhage, 11, or 1 in 200; retained placenta 40, or 1 in 55; eclampsia 10, or 1 in 220; prolapse of cord 4, or 1 in 550; accidental hæmorrhage 8, or 1 in 275; monstrosities 11, or 1 in 200; brow 2, or 1 in 1,100, and one each of face presentation and hæmatoma vulva. This shows a total of 557 cases, or 2 per cent., in which interference of some kind was required as against 60, or 7 per cent. in the first series.

The maternal deaths were 11 in number, being 5 per 1,000. Of these, two were due to eclampsia; one patient delivered by the forceps had mitral valvular disease with bronchitis, and died suddenly on the fourth day; one patient was sent to Dundee by my locum tenens, and was delivered there with the forceps, but died two days afterwards from exhaustion; one patient who had a normal labour died ten days after confinement from advanced phthisis; one patient delivered with the forceps died of sepsis; and five patients died of sepsis following a normal labour. There were then six deaths from sepsis, or 2.7 per 1,000 of the whole. This is so important a part of my argument that I append a short note of each case.

No. 72.—Mrs. M., iii-para. Quite normal labour. Had a rigor on the seventh day and died on the sixteenth day.

No. 306.—Mrs. W., iii-para. Easy labour. Placenta delayed in passage and needed help with two fingers in the vagina. Six days afterwards had a slight temperature, never going very high till the end, but persistent. Was seen by an Edinburgh specialist, who ordered sublimate douching, intrauterine; died on the sixteenth day.

No. 454.—Mrs. T., iii-para. The forceps used for weak pains. Developed the symptoms of sepsis and died. In this case we found afterwards that the "handy wife," a very good woman, but ignorant, had been helping to nurse some scarlet fever cases in the same block of buildings. This was many years ago, in 1891.

No. 549 was under the charge of my locum tenens while I was

on holiday, and I got no particulars, except that she had an easy labour.

It will be observed that these cases were all in the first 550 cases of the series, the latest being in 1891, only one being an operation case. This group, being exactly one-quarter of my experience, I put in one series, as against the rest, being three-quarters. In this latest three-quarters there are only two septic deaths, neither being an operation case, as follows:—

No. 1541.—Mrs. B., iii-para. Had quite an easy labour, being only once examined, with the usual precautions. The cottage was unusually insanitary, having stood empty for a long time and being very damp. On the fourth day she had a rigor and eventually died. I found that the infant was suffering from erysipelas of the cord which had been going on for some days, the old woman in charge not thinking fit to report it to me. The child died also.

No. 2065.—Mrs. M., i-para. This case is of special interest as it seemed so entirely normal. She was examined once under the most strict precautions to ascertain the condition of the os, which dilated quickly. The membranes were unusually tough and were ruptured on the perineum, after which birth took place without the slightest perineal tear, the most intact perineum I have seen. She made an uneventful recovery, and on the ninth day was out in the garden when she had a chilly feeling, and I was sent for. The temperature was 104°F. No pain nor interference with milk or lochia. Beyond slight pain in the left flank no local symptoms whatever. No examination was made. Quinine was given, and the temperature went down on the eleventh day for 24 hours, when it rose again. Still no local symptoms. She was now seen by a Dundee specialist, who examined her, thought the right tube was tender, and diagnosed a pyosalpinx. Blood culture showed a few micrococci. There being no indication for local treatment, she had vaccines, both stock, and then autogenous, phylacogen, and stimulants. She died on the thirtieth day after confinement.

Grouping now the three periods, the series of the "fifties," when no idea of infection was dreamed of, the second, in the "eighties," when it was perceived to have a bearing on obstetrics, and the modern period, when antisepsis is carefully carried out, we have as results on the maternal mortality:—

First period 936 cases, gross mortality 21 per 1,000, non-operative 17 per 1,000; second period 550 cases, gross mortality 10 per 1,000, septic 7.2 per 1,000; third period 1,670 cases, gross mortality 3.6 per 1,000, septic 1.7 per 1,000. These figures, I submit, favour my contention that the mortality, 70 or 50 years ago, was much more than is commonly believed. *A priori* it was to be expected that improvement should take place. The state of knowledge in the

first period was so different that it would be very extraordinary if we could do no better than those so handicapped by ignorance. The second period, again, was one in which antiseptics, as applied to obstetrics, were only in their infancy. This may be illlustrated by reference to the literature of the time. Take Robert Barnes,[5] for instance, his work is one which even now may be read with profit, *e.g.* his chapters on podalic version. But his list of "instruments and accessories in order to be prepared for all emergencies" includes nothing antiseptic but permanganate of potash—"℥i of the permanganate in ℥x of water makes the 'antiseptic injection' to be injected through the uterus after labour to counteract septicæmia." His directions for transport are really worth reproducing, giving the light they do upon the current ideas in 1871:—

"The most convenient mode of packing these things is to adapt a travelling leather bag. There is always spare room for anything likely to be wanted besides its ordinary furniture or for bringing away a pathological specimen; and by turning out the obstetric furniture you have a travelling bag again."

My own recollection is to the same effect. In the seventies, even in Edinburgh, we were not taught to apply the antiseptic method in obstetrics. I well remember our friend, the Emeritus Professor of Clinical Surgery, when clerking with Lister, discussing the future of the antiseptic system, and predicting that one day we should have to apply it in midwifery; whereupon much hilarity prevailed at the idea of spraying the perineum. Remember that in those days the air was believed to be the principal source of danger, hence the spray.

The early cases of the series then were treated on the most elementary lines of antisepsis. A pair of wooden-handled Simpson forceps, a bottle of ergot, another of carbolic acid, and some carbolic oil as a lubricant, were the usual accompaniments to a case. The instrument makers used to sell a handy case containing two bottles, one for ergot, one for oil, a.g.e. catheter, a pair of scissors, and some needles with a bobbin of silver wire: and there you were. Let us here contrast the modern ritual, for it is nothing else, to be performed (*a*) at an ordinary case, (*b*) before operation.

At every case the external examination is made of the abdomen, to know the lie of the child and position of the fœtal heart. Gloves are being boiled, while the hands are scrubbed as for a surgical operation. Nurse having given an enema to wash out the bowel, the perineum and vulva are well scrubbed by the doctor himself, the soap used being that liquid soap sold as "Sterilla," applied on a pledget of wool and rubbed to a good lather; wiped off with pledgets of wool wrung out of lysol solution, always

clearing away from the ostium towards the anus, not otherwise. The hands are again sterilized with sterilla. The gloves are now emptied from the saucepan into a basin which has been scalded with boiling water. They are taken out thus. The left is chosen, emptied, and put on. It lifts out the right which is then put on, and both washed in the boiled water to which lysol or biniodide of mercury has been added. The left hand then lifts the patient's right labium clear so that the ostium is well shown. Having decided how many fingers are to be inserted, these are passed into the vagina, taking care not to touch the labia on the way. The next finger must not be passed; it has necessarily been pressed up against the anus, and is not safe. The examination having been made, the gloves are washed in the solution and boiled again.

If an operation has been decided upon, in addition to the foregoing procedure, the bladder is emptied. The patient is placed in the required position, and chloroform is given till she is nearly "over," when nurse takes the towel. The perineal toilette is repeated. A clean tunic is put on, the hands are sterilized, the gloves, sterilized with the instruments in a sterilizer, are put on, and the operation proceeded with.

If, then, we consider the difference of treatment in these three periods, we must come to the *a priori* judgment that there should be some difference in the mortality results; and when we consider the figures I have given we may perhaps feel that *a priori* judgment is justified in point of fact and of experience, and that my first contention has some logical grounds of support, namely, that the puerperal mortality shows a progressive improvement as the years go on.

II.

The second question which I wish to consider is the belief widely spread among gynæcologists, that much of the mortality, or morbidity, is due to operative interference. I shall deal with the morbidity question later on, but as to mortality, my series of cases points towards the view that mortality is relatively low in operation cases, and correspondingly high in "normal" cases, not subject to operation. In the first series, four fatal cases in 62 operations is not surprising, considering the state of knowledge at the time, especially when there are in that series 16 cases of death on which, presumably, no operation had taken place. In the second series, only one forceps case died of sepsis, and one from exhaustion in Dundee. True, the patients dying from eclampsia and heart disease each had the forceps applied, but their deaths cannot be charged to the operation which in each case was performed to combat the greater peril. One septic death in 393 forceps cases is

not an inordinate mortality, and there were no deaths in the other 164 patients upon whom operative procedures had been undertaken.

There being thus one septic death in 557 operations, what is the figure for the "normal" cases? Taking 557 from the total of 2,200, we have 1,663 "normal" cases with five septic deaths, or one in 333 cases. Both series of cases, then, seem to bear out the belief held by most men in general practice that sepsis occurs at least as often in cases in which little or nothing has been done as in operation cases. Many would say that even fatal cases occur when the patient has not been touched by either nurse or doctor. I have had no fatalities, but one frequently has cases of "morbidity."

Let me quote three:—

(1) A tramp wife, in a common lodging-house, had a premature infant. She had it very rapidly, and all was over before I came on the scene. There was no nurse, so no one else could have touched her. She went through the usual course of a puerperal sepsis, but, having the constitution, tough as leather, of the tribe, she won through. (Oddly enough last year I had another of the same class in the same lodging-house. It was a cross-birth, and required version. She made an uneventful recovery.)

(2) Twenty-five years ago a young woman came home to her mother's house to have an illegitimate child. She had no difficulty, and I attended her, a quite normal case, not touched by either her mother or me. Yet that young woman came through the longest period of puerperal peritonitis I have ever seen.

(3) Two years ago a woman in labour sent for the district nurse, who, seeing that she was progressing rapidly, sent for me. I arrived after the birth of the child. It was a simple case, and was touched by no one. On the fourth day she had a temperature of 102°, with pain, tenderness, slight diarrhœa. Seeing the temperature remained high, I explored the uterus under an anæsthetic. Finding nothing but a few shreds on the placental site, I washed out the uterus, swabbed with carbolic, put in a drain, and the patient was normal in 24 hours. Such cases are constantly met with in practice, and suggest that not all cases of sepsis are due to infection from outside the body *and that some other factor than conveyance of sepsis is present.*

Fœtal Mortality. The effect of the delivery upon fœtal mortality is an important point which may be dealt with here.

Of the 393 forceps cases, 192 were in primigravidæ with a fœtal mortality of 10=5.28 per cent.; 201 were multiparæ with 6 deaths, or 5.2 per cent.; being in all 16 deaths=4.07 per cent. In all the operations, 557, there were 49 deaths=8.6 per cent.; these included all the deaths, details of which are stated in the table. The total

deaths in non-operation cases were 32, or 1.9 per cent., these being chiefly due to premature births. The mortality over all was 81, being 3.8 per cent. of the whole.

Morbidity. Leaving now the question of mortality, let us consider the charge that is made with regard to morbidity. No need here to take up your time by quoting expressions of opinion in support of this. We must accept the statements made to the effect that cases of injury from forceps delivery are frequently met with in gynæcology. Comyns Berkeley, in particular, may be taken as giving voice to this view.[7] Evidence such as his cannot be denied its full weight. There is certainly a considerable amount of perhaps avoidable mischief done by interference in unsuitable cases, or by a less degree of skill than might be applied. Various explanations are given, the most common being that the teaching of midwifery does not include sufficient practical work. Most probably errors of judgment in selection of suitable cases and of the proper time for interference are at the bottom of the mischief.

The use of the forceps is believed to cause a large amount of morbidity. I have tried to follow up my forceps cases with the view of noting any adverse results. Of localized injury to the fœtal head, cases were fairly frequent, but were temporary, leaving no after effects. I have had one cephalhæmatoma which did no permanent damage. Some have alleged that epilepsy, idiocy, or mental deficiency can be charged to the abuse of the forceps. I have examined this from both sides, going over my forceps cases to find any that developed any of these nerve tendencies, and conversely getting the history of epileptics and idiots in my practice to see if the forceps had been used at birth. Of the 393 forceps cases I can trace 119. I find in these 119 forceps cases two imbeciles. Both were rather microcephalic than otherwise, and needed forceps delivery on account of the mother's weakness. There are many women, of the Mrs. Dombey type, who simply do not know how to bear children. What to others comes naturally, almost reflexly, they can make nothing of, and have to be helped both in the second and the third stages. One of the two was an elderly primigravida with feeble pains and no idea of helping herself. The other had an interesting obstetric history. The wife of a wealthy banker in one of the European capitals, she was the daughter of a well-known Edinburgh family residing in a country house near us. She had had a very bad time with her first child, abroad, and determined to come home for her next to her mother's house, and incidentally I had the care of her. Her labour was tedious, not from disproportion but from want of physical energy to deliver herself. The forceps were required and she made a good recovery. The child, a girl, did well, and is long since happily

married. The next was the case in question, another forceps case, and a Mongolian imbecile, who died lately, aged 30 years. Two years afterwards she had a breech presentation, and finally, two years after that, a boy, also a forceps case, a healthy boy, who did his part and was grievously wounded in the Great War. This case illustrates the type which is so frequently the subject of forceps delivery, the weak woman of no physique, who just goes on making futile attempts to deliver herself, until one steps in and helps her. With all these instrumental or operative interferences she was none the worse; I had the care of her for years afterwards, and she never had any uterine trouble.

Two women gave birth to children who developed epilepsy. Neither of these required the forceps. On the other hand, of the 119 cases, I find a very large number who in after life have done exceptionally well, probably on account of the large heads which necessitated the use of instruments.

Then, again, there are the women well built and muscular who have some slight degree of the *justo minor* pelvis. Let me give the history of one. She was a ploughman's wife, and came to me at her third confinement. The two previous to this had been attended by one of whom you will approve. He told me once, with pardonable pride, that he had gone for ten years without applying the forceps. He had kept this woman without any help in two confinements, and she approached her third with fear and trembling. There was nothing wrong with her but a small pelvis, and I delivered her quite easily, much to her comfort and joy. Her next was also under my care, and I remember the gladness in her voice when I appeared. "Eh, doctor, that's richt. Come awa wi' yer gibbles!" Her next was a normal case, all were delivered alive, and she never had any sign of uterine trouble of any sort. It must, of course, be remembered that the class of person met with in the country is very different from that in the poorer parts of Edinburgh, and particularly in Glasgow. We do not have rickety pelves, perhaps a "flat" pelvis very rarely, and this accounts for the comparatively good results that we can show.

Then with regard to maternal morbidity. This may be divided into that from sepsis, uterine displacement, and perineal injury.

For a case of sepsis after forceps extraction I have searched my records. I can give only three cases, one a bad one. It was one of those very trying cases occurring in a primigravida, with occipito-posterior position, a tough undilatable os, and powerful pains. This was about 20 years ago, before the modern way of dealing with occipito-posterior positions was generally known. Neither chloral hydrate nor chloroform having any effect on the os, it was dilated by hand until there was room to get at the head and

apply the forceps. Delivery was then effected without much force being applied, and the child was born alive. But sepsis of a mild form set in. Before it was lessened she had to remove from their house, and she passed from my care to that of a colleague who told me that pelvic cellulitis had developed, and after about eighteen months she died. This case is my one regret in all my experience, and I learned much from it—this, namely, never to apply the forceps until the first stage is well over and the head engaged in the pelvis.

Another was a rather old primigravida, in whom I had applied the forceps for weak pains, and in whom I had to give help in removng the placenta, which was not retained, but rather lay in the vagina till someone would help it out. She had a mild septicæmia which stopped at once on being douched with weak lysol. The third was my first "failed forceps case," in 1887. As far as I can follow my cases, these are all the forceps cases which have gone septic.

Post-operative sepsis in my experience is most commonly met with where we should naturally expect to find it, namely, in cases of retained or adherent placenta.

Retained Placenta. By this I mean a placenta which has remained within the uterus for an hour after delivery and has resisted attempts to remove it by pressure. I have had 40 cases; in these there was sepsis in seven, the others had no rise of temperature. There are a few points of interest in the experiences of these cases. Only 16 were retained placenta pure and simple. Of the rest, 12 were after forceps delivery, one was a placenta prævia, one had a really bad post-partum hæmorrhage, there were seven sepsis cases, and three were after anencephalous fœtuses. Now there were seven anencephali in my series, so that for three out of seven to be connected with retention of the placenta may indicate some connexion between these morbid conditions. Two women had the condition twice each and both in consecutive pregnancies. The degree of severity varied much. Some occurred in that class of whom I have spoken before, the woman who cannot help herself, and cannot even get up strength to push the placenta out of the uterus, and there it lies until one withdraws it. Two of the worst sepsis cases occurred when only the membranes were adherent. One was a strong, healthy woman, living the active life of a farmer's wife. Her sixth confinement was the only one at all abnormal, as a brow presentation threatened. I managed to push it up and got down the occiput and she delivered herself all right, but the membranes did not come fully away. She was pretty worn out, so I left her to nature. Sepsis developed. I washed the uterus out, but this did not stop it, and an Edinburgh specialist saw her. He repeated the clearing-out process and dosed her with phylacogens,

after which she began to improve, and eventually got quite well, but has had no more babies. The other delivered herself of the placenta normally, but a large surface of membrane was very firmly adherent. She developed a septicæmia from a staphylococcal infection. This was in January 1897 when vaccine treatment of sepsis was just being discussed, and I published the case in the *Edinburgh Medical Journal* of that year. She has had no more children but is in good health. I think that, as a rule, few women again become pregnant after having had an adherent placenta removed.

For uterine displacements there is much the same report to make. I have one case under my care of a woman whom I delivered 25 years ago of her second child. The first had been a forceps case, as was the second, and ever since there had been a tendency to displacement, which within the last few years required a support. But again, on the other hand, I get cases of displacement in which the forceps had not been used. Thus I have a case in which the child turned out to be an epileptic and the mother has a prolapse. Here, surely, is a case for the prosecution. But on looking up my records I find that the labour was perfectly normal. Again, I had an old woman with a very bad procidentia, who told me that thirty-three years before I had attended her in child-birth. Here, again, I went to my records. Another "normal" case. The procidentia was caused by some calcareous fibroids, which were removed and she is now well.

Similarly with perineal injury. The forceps cannot properly be blamed here. The worst cases of perineal tears are from midwives' cases of the old type. I have seen two complete tears into the rectum in such cases, one an aged woman who had many years ago been attended by a midwife. The ostium vaginæ and the anus were in one with a slight partition, the anterior wall of the rectum coming down to about an inch from the orifice. The other was a woman whom I attended in labour and on examination could find no anus. The condition was the same as in the other case. She had complete control except for the passage of flatus. Two observations fall to be made. One, that far from the forceps being a cause of tears, if properly used, they often help to avoid them. To pull with the forceps when the perineum is on the stretch during the height of the uterine systole is to court trouble, but if during the asystolic period, when the soft parts are relaxed, we gently coax the head down, using our leverage to bring the occiput well forward, we can usually save the perineum completely. Another is, that if a tear is made, it behoves the accoucheur to see that it is mended. I had a case illustrating this the other day. My patient, under treatment for an acute diarrhœa, said that it was very difficult for

her, as, since her last baby 31 years ago, she had never had proper control on account of a tear she had got then. Now I myself had attended her in her first confinement 35 years ago. She was then a fairly elderly primigravida, needed the forceps, and had a tear which was repaired at once. In her next two confinements the same thing occurred. The doctor stitched the perineum once, but on the last occasion he did not do so, and for 31 years she has had to suffer the consequence.

The real test as to alleged injury done by using the forceps is to find out how far it has interfered with functional fitness. Has the woman been able to have children afterwards? I find on looking at it from this, I submit, reasonable criterion, that the prospect of future parity is distinctly good. I have gone over the family histories of as many of my patients as I can trace, and the general trend of their histories is to bear this out. Thus of 60 women who had the forceps applied, 38 had one or more normal labours afterwards; 13 had to have the forceps in subsequent labours; 3 had first normal and then forceps labours; and only 6 did not have another infant. Of these one died some years after the event; one was an aged primigravida; one gave birth to an illegitimate child; leaving only three healthy young working-class wives in whom further labours might have been expected.

On the whole question of the use of the forceps, I submit that the risk is being exaggerated at the present time. Any damage that is done is apperently done because some very simple rules are broken. If we all waited till the os was fully dilated and the second stage well advanced over two or three hours; and if we applied the sound surgical rule that when operation is indicated the sooner it is done the better for the patient; and if the most complete care were taken in antisepsis, there need be no such dreadful exhibitions as are described in Comyns Berkeley's address.

After all, this controversy is a perennial one—it is not being raised by any means for the first time. In the end of the seventeenth century it was the great de la Motte who permitted himself to say that "he who keeps secret" (and *a fortiori*, he who objects to the use of) "so beneficent an instrument as the harmless obstetric vitals for all eternity!"[7] But the opposition was strong enough to succeed in lessening the frequency with which the forceps were used, so that we find in Hamilton[9] an abstract of Madame la Chapelle's practice in 1816 in the Hospice de la Maternité in Paris. Of 15,380 patients, only 93 were delivered by the forceps, or 1 in 165 cases, which has quite a modern look about it. She gives some account of 49 of these cases. "Seven women were 30 hours, two were 33 hours, one 48 hours, two three days, two several days, and

one had been three days under the first stage. Thirteen women of the 49 died. Twenty-six infants were born alive."

Clearly then Madame la Chapelle was not a defender of the usage. Hamilton himself, though he deprecates keeping a woman in labour for more than 24 hours in the first stage, yet says that in 48 years' practice he only applied the forceps in 33 cases.[10] The advocates of the forceps appeared to have rallied again, for Haeser, writing in 1875, alludes to it as one of the most beneficial instruments ever invented.[11] And Barnes [12] says of it: "Take, for example, the noblest instrument of all, the forceps. The more perfect we make it, the more lives we shall save, and the more we throw back into reserve those terrible weapons which only rescue the mother at the sacrifice of her offspring."

What are the alternatves to forceps delivery? Cæsarean section or craniotomy seems most in favour. This being a paper which is concerned with country midwifery, the Cæsarean operation is practically out of court. Probably in days to come it will be simplified. It is not a difficult operation even now, and the younger generation may take the cases into the nearest Cottage Hospital and do them or have them done; but the time is not yet. As for craniotomy, a revolting procedure, I have only done it once on a dead baby in a tramp lodging-house. I had applied the forceps (this was long before the axis traction forceps came in), and after perforation I finished off with the forceps; the mother did well. The operation itself is not difficult, but it is revolting in all its aspects, and I venture to think there is yet a better way. Version is my next resort, and I do not understand the modern projudice against it. I have used it in all the cases, nine in number, in which I have failed to deliver by means of the forceps, and I have had no bad results such as are so graphically described in Shannon's valuable paper, "The Failed Forceps Case and its Treatment."[12] I note that though he, like most others, inclines to Cæsarean section or perforation, yet on occasion he resorts to version. I should say that all of these occurred before 1895, with the old Simpson forceps. Since using the Milne Murray instrument I have had none. What used to happen was that in an occipito-posterior position, if much pressure were put on, the forceps began to slip, and the danger arose of them suddenly giving way and causing extensive laceration. In such cases I used to take them off, pass in my left hand, turn, and deliver if necessary with the forceps to the after-coming head. I agree with Barnes,[13] who says: The head will come through the pelvis more easily if drawn through the base first than if by the crown first."

All the mothers recovered without morbidity except the first, away back in 1887, who had a mild sepsis. Four children were

alive. They were mostly working women of the agricultural labour class, a very migrant tribe, so I cannot trace all of them; but one I delivered quite normally two years afterwards, and another 18 months afterwards of twins, version being again performed with good results both for mother and children.

Another condition in which we are warned against version is hydrocephalus, when craniotomy again is prescribed. In both my cases of hydrocelphalus I performed version. In the second I had to apply the forceps to the aftercoming head, and Barnes' dictum above quoted was justified. In point of fact the hydrocelphalic head comes away with surprising ease when so treated. I had a case showing this not long ago. A young locum tenens sent for me to help him with what he described in his message as "locked twins." On my arrival I found a footling presentation, and what had misled the young doctor, a large swelling above the pubes, soft, fluid, and with some bony points in evidence. I washed up and examined. There was no sign of another head, and the swelling seemed continuous with the rest of the child's body. So with a very little traction the whole head came down with a "cloop" like the cork out of a bottle. All three women became pregnant in due course of time and all had normal labours.

Version is at the present time rather underrated. Besides these nine "failed forceps" versions, I have done it 31 times in this series for many conditions, losing 15 children, including the nine monstrosities. All the mothers recovered. One woman, a tradesman's wife, had it performed four times. Her first child was stillborn, delivery by the forceps. Sixteen months afterwards she had a footling for which version was performed, a difficult case in which the arms were over the head, one requiring to be fractured to get it down. That was in February 1897. In October 1899, she had another footling which was also turned, more easily this time; in April 1902 yet another footling, also turned. She rested until July 1908 when she had a breech presentation, when version was also done. This concluded her obstetric history, and of gynæcological history she has none.

Let me put in evidence my last version case, which I fear transgresses some of the rules of present-day teaching.

No. 2179.—Mrs. T., aged 31, primigravida. Premature rupture of membranes, 5 a.m. Sent for district nurse during the day. No pains till evening, when nurse sent for me. Os fully dilated, pains strong. Anterior lip swollen, being pressed on by vertex. There had been bleeding going on since morning from a partial placenta prævia lying over the posterior lip. It was a head presentation, but felt curiously soft like a dead head, but fœtal heart could be heard. Under chloroform, I tried to put on the forceps, but could

not get them on, so decided to turn. It was very difficult. The liquor amnii had drained away fifteen hours before, and there seemed no resiliency in the body. It took about two hours to turn, and when I had got a foot down I had to fix a tape to it; then, with two fingers on the head, with traction on the foot, I got the version completed. As the body came down a *spina bifida* showed itself, and I then saw where the difficulty had been. With the forceps applied to the aftercoming head I brought down a large hydrocelphalus. One hoped to be at the end of one's troubles, but after waiting 45 minutes for the placenta to clear, it came, but with a sense of something giving way. The condition of the patient was wonderfully good, so I gave her pituitrin, 0.5 cc., and left her. She ran a slight temperature for two days, and as it was 101.4° on the third day I gave her chloroform and drew down the uterus. I gently removed with my fingers and washed out the uterus. Temperature 98°, pulse 100, on completion of the operation. On the sixth day pulse and temperature were normal and remained so. This patient has already become pregnant, and has had a quite normal delivery. It is not often that one meets with a combination of five abnormalities in one case.

I need hardly remind you that in pleading for the more frequent practice of version as against the lethal instruments, I am sinning in good company. Sir James Simpson, addressing this Society on January 20, 1847, put forth a similar plea, and quoted a case which takes rank as one of great historical interest. It was that of a patient "very lame, with the lumbar vertebræ much distorted," upon whom at the last pregnancy craniotomy had been performed after the forceps had been tried and failed. On this occasion ether was given, being the first case in which it was used in labour, and Simpson turned and extracted the infant in "not above two or three minutes," preferring, "above all, the transient and not necessarily fatal depression of the flexible skull of the fœtus for the destructive and necessarily deadly perforation of it." As the patient "left her bed, dressed, and walked into the next room on the fourth day after delivery," one feels that altogether she might have met with similar treatment seventy years later, and thus might be regarded as seventy years in advance of her time.[14]

These reminiscences of country practice have carried me away from my main line of argument. But there is yet another subject of interest on which I should like to say something before resuming it, namely, the development of our knowledge of eclampsia during these forty odd years.

Eclampsia and Albuminuria. This toxic condition appears to be on the increase. In the first series of 936 cases, there were three eclampsias, practically three per 1,000 cases. As any albuminuria

at that time, being untreated, would most probably develop into eclampsia, we may take this as an indication of the prevalence of the condition. In 1,165 cases under my care I had 10, 5 of albuminuria and 5 eclampsias, or rather under 10 cases per 1,000. From case 1165 till my last case, No. 2120, were 955 cases, in which I had 5 eclampsias and 9 albuminurias, making 14 in all, being as near as may be to 15 per 1,000. In the three series, therefore, the ratio runs up from 3 to 10 and 15 per 1,000, a very definite increase. I may now detail some of the cases.

My first case, in 1887, was tragic. I was sent for to the country to see a girl said to be having fits. I found her, an unmarried girl, who had just come back to her mother, in labour, and having one convulsion after another. The second stage was well advanced, head nearly reaching the perineum, so I delivered with the forceps at once, and then treated the convulsion as best I could, but with no result, and death took place very soon. The case contrasted with a case of albuminuria and dropsy which I had had early in the year. A primigravida, aged 22, seven months' pregnant in December 1886, had œdema of legs, thighs, and vulva, labia much swollen. Urine heavily loaded with albumen, and contained granular casts. Put to bed with appropriate milk diet, alkalies, and diuretics, the œdema largely subsided, had not disappeared by the date of her confinement, which came off on January 15, and was uneventful. Symptoms subsided, and by March the urine was practically normal. She had another child in December of that year, when there was no return of the albuminuria. She then, in December 1890, had albuminuria in a third pregnancy, without eclampsia, and since has had a large family without any trouble. From that time I always enquired as to symptoms suggestive of kidney mischief, and whenever there was albuminuria I treated with alkalies and milk diet with uniform success. But, in 1899, I had a case without any warning. She was a farmer's wife, a primigravida, over 30 years of age. The first stage was rather long and I left her for a time. On returning I found her just going into an eclamptic fit. Fortunately, the second stage had begun and I was able to turn and deliver her of a living child. Under chloroform she came round. She had had no preliminary symptoms of any kind, and two years later had a normal labour. From that date I have examined every woman's urine before labour if I could get it, and that is now not at all difficult. No case of albuminuria that had been under treatment became an eclampsia. Two eclampsias died. Treatment in all was chloroform in the first instance, and chloral hydrate to follow. One resisted treatment with chloroform, but the fits ceased at once on bleeding. One albuminuria case was of interest, in that she had had one kidney

removed. She did quite well. I have also had to attend two women who were epileptics. Neither gave any trouble during the confinement, but each had fits shortly after. One patient who had eclampsia, three days after labour, developed mania, from which she recovered in a few months.

Three of the 10 cases were in unmarried girls, and all were very severe. One was an interesting medico-legal case. She was a domestic servant with an old lady who sent for me one Sunday afternoon to say the girl had had a fit. I found that she had been in her usual health except that she had spoken of having missed some periods to her mistress. That morning she had a slight fit which passed off. In the afternoon she had a bad seizure, and they sent for me. She was then deeply unconscious. There was some hæmorrhage going on, and the uterus could be felt above the pubes. In these circumstances I diagnosed eclampsia in a probable four months' pregnancy. I got a colleague to give chloroform, and explored. I found the uterus empty and with a relaxed cervix. It was evident that she had had a child not far off full-time. The urine was of course loaded with albumen. Under chloroform, with chloral hydrate to follow, she soon came round. The police took charge, and found a full-time fœtus in a brown-paper parcel in her trunk. It had been born dead. She was tried for concealment, and a sympathetic jury let her off. The Salvation Army have given her work. One of the other unmarried girls died, my first and last case of eclampsia, now 35 years ago. The other fatal case was under the care of an assistant during my absence on Service.

The general inference from these experiences seems to be that this, the most dreadful complication of maternity, while certainly more common, is very amenable to preventive measures, and that with good prenatal care it should become very infrequent.

III.

Coming back now to the main line of thought. Is it still to be believed and taught that for seventy years no advance has been made, no serious encroachment upon the mortality of those days? Is this paralyzing doctrine still to be preached that all our efforts have been of no avail, that women are dying as they used to do in the old days, that in obstetric practice alone the teaching of Lister had no result for good? We are then on the horns of a dilemma. Either there has been some improvement, roughly comparable to the statistics given, or there has been none, in which case the question arises, why? The proposition I am now to pose is this, that while there are grounds for believing that improvement has taken place, it is still unaccountably small, that there remains

what has been called "an irreducible minimum," and that we should seek some explanation of our failure to achieve better results with all the effort that has been made, and is being still more strenuously made. Is there not a *tertium quid* which has not been explored?

In every other department of medicine attention is being paid to the factor of immunity. We postulate the existence of such a factor, and we have means whereby it may be utilized in prophylaxis or in treatment. This point need not be enlarged upon. Tuberculosis and diphtheria, to name only two diseases, have been largely influenced by dealing with the immunity factor. And its "opposite number," decreased immunity, or increased susceptibility, is also not unknown. The hypothesis which I wish to submit for your consideration is this, that in the parous woman we may have for the time being an increased susceptibility to death, and that this is the *tertium quid* which has never been considered as a whole, and allowed for as a prime factor in the problem. Consider the known facts. A woman is the subject of organic heart disease. If she does not become pregnant, she may go on for many years and quite possibly died of something else. If she becomes pregnant she will die, if uncared for. And she will die, not at her confinement, which conceivably might be expected to strain her weakened heart (*vide* Jellett *infra*), but she will suddenly die a few days afterwards when doing nothing in particular. Similarly with tuberculosis. This, again, in the nullipara, may go on for years. Let her become pregnant, and what happens? She has taken on her principal duty to the race; and nature supports and sustains her till that duty be fulfilled. But when it is over she dies. Three per cent. of women [15] are subject of an autogenous toxæmia. If not watched and controlled they may die in eclampsia. In labour, apart from operation, they are far more susceptible to sepsis than at any other time. Take a case. A woman has a baby, untouched by nurse or doctor. Her only lesion is a small perineal tear. She develops sepsis and dies. If she got that tear in the non-pregnant condition, say by injury, would there have been the slightest reason to expect death? Finally, it is a very old experience in the dead house, that a cut received in dissecting the body of a woman dead of puerperal fever is almost certain death. Why? Is it not that in a subject in whom the immunity factor is decreased the strain of organism present is correspondingly virulent? Are there not reasons, then, for postulating in the parous woman, at this point alone in her sex life, a decrease in the power of the forces that resist death which in their entirety we describe by the term immunity? The text-books are silent on this point. Labour is taken to be a physiological process in a healthy woman. The only author I

can find who even discusses the matter is Henry Jellett of Dublin.[16] He says:. "Labour is a physiological process, and as such has no more an inherent rate of mortality than has any other physiological process. . . In all cases in which the mother suffers from any disease of sufficient intensity to be influenced by constitutional changes, labour will be attended by a rate of mortality. There is nothing strange in this. The act of emptying the rectum or bladder is a physiological process, and is unattended with mortality in normal circumstances, but if an individual suffers from cardiac disease, aneurysm or such like pathological conditions, the mere natural straining necessary to perform the act of defæcation or micturition may be the *causa causans* which completes the breakdown of the heart or the rupture of the aneurysm. . . . The process of labour renders a woman especially liable to infection." But no one has asked the question, Why? Why is she so liable? Why does intercurrent disease kill her then and at no other time? And why does it wait till labour is over and kill her then?

I submit the proposition that it is something deeper than we have yet surmised. Life and death are inextricably mixed in nature. That "genesis" has a profound effect upon the living organism, while sometimes the theme of the seer and the poet has only been dealt with in our times by one deep thinker Herbert Spencer.[18] He shows, by instances from botany, that the effort towards the preservation of the species causes such an effect upon the organism that when the sex function is fully developed the growth of the individual stops. He does not go on to deal with it in its power of affecting the life of the individual, but as we shall see there are cases when life becomes extinct soon after the race effort is consummated. He points out from a study of the coco-nut palm, that as fertility begins growth gradually stops, and *pari passu* the one declines as the other advances; so that by the time that full reproductive power is established growth entirely ceases. "Here," he says, "we see the antagonism between growth and sexual genesis under both its aspects—see a struggle between self-evolution and race-evolution, in which for a time the first overcomes the last, and the last ultimately overcomes the first."[17] And in a footnote he quotes Carpenter's *Physiology*; "there is a certain degree of antagonism between nutritive and reproductive functions, the one being executed at the expense of the other. . . . It may be universally obserevd that, when the nutritive functions are particularly active in supporting the *individual*, the reproductive system is in a corresponding degree undeveloped, and *vice versa*."[18]

Now, this "struggle between self-evolution and race-evolution" does not end with the cessation of growth. Many forms of plant life die down at once on fulfilment of the sex instinct, the grasses

for example. In the insect world, notably with the spiders, the males die off, or are killed off by the females immediately after having fulfilled the sexual function, while the females themselves die soon after constructing the cocoons.[19] J. H. Fabre, after describing the courtship of that curious insect the praying mantis, says:—"During the day or at least next morning, the male is seized by his companion who first gnaws through the back of his neck and then methodically devours him, leaving only the wings." "The mantis is never satisfied with embraces and conjugal feasts. After a rest of variable duration, a second male is welcomed and devoured like the first. A third succeeds him, does his duty and affords yet another meal. . . . In the course of two weeks I have seen the same mentis treat seven husbands in this fashion.[20] Similarly, with another insect, the golden gardener beetle, "the foolish creature allows himself to be devoured without retaliating. This tolerance reminds one of the scorpion of Languedoc who, on termination of the hymeneal rites, allows the female to devour him without attempting to use his weapon, the venomous dagger which would form a formidable defence." . . . "It reminds us also of the male of the praying mantis which still embraces the female though reduced to a headless trunk, while the latter devours him by small mouthfuls with no rebellion nor defence on his part."[21]

These apparently are instances in which the individual having fulfilled his duty for the race is regarded as of no account, and finished off accordingly. On the part of the female, also, there are instances in Nature where she dies immediately after concluding her sexual function. To given one instance, it has recently been shown [22] that in the long and complex life-history of the common eel, born in the far-distant Sargasso Sea, 3,000 miles away, they cross the Atlantic to migrate to our rivers and ponds. Years afterwards both sexes betake themselves back to the depths of the Sargasso Sea and there the females deposit their ova and immediately die, the sexual function having been completed.

Here, then, we have evidence that not only does growth stop with the fulfilment of the sexual function, but that with certain plants and animals life itself ceases when the preservation of the species has been provided for. And I suggest that in woman there is a tendency to reversion here and that parous women show a tendency to death after the performance of their great function, a tendency not shown by their nulliparous sisters.

The position then is that the statistics usually accepted give the distressing pronouncement that maternal deaths, and, presumably, maternal morbidity, are as they were fifty years ago. Figures have been laid before you which disagree with the pronouncement; and unless we accept these we are left on the other horn of the

dilemma, namely, we must accept the pronouncement and say that 50 years of improvement in all other branches have no counterpart in obstetrics. I have raised the question in the attempt to solve the anomaly. Can there be a hitherto undetected factor? Has the immunity resistance of the parous woman ever been considered? Is she really in a physiological condition similar in all respects to her nulliparous sister? And I suggest that this is not so, and that in a lowered resistance we may find the *tertium quid* which seems to be waiting recognition.

I have ventured to call up the seer and to quote the poet in support of different proofs of my theory. Who does not remember that marvellous prose poem in which Ecclesiastes describes the approach of old age:—"In the day when the keepers of the house shall tremble and the strong men shall bow themselves, and the grinders cease because they are few, and those that look out of the windows be darkened . . . *and desire shall fail*; because man goeth to his long home, and the mourners go about the streets" (Ch. xii., verses 3-5).

Then the supposition that women may exhibit traits indicating reversion to lower types is very curiously supported by the researches of J. H. Fabre which I have quoted as to the way in which the praying mantis devours her lover. Readers of Keats may have been puzzled by a phrase in his Endymion":—

> "Within his car, aloft, young Bacchus stood
> Trifling his ivy dart in dancing mood,
> With sidelong laughing,
> And little rills of crimson wine imbued
> His plump white arms, and shoulders, enough white
> For Venus' pearly bite."

We may take it that the Greek knowledge of sex matters was varied and profound; and they would not give to Venus an attribute quite unknown in their experience of woman. This discovery of Fabre's throws light upon this allusion in modern poety and so far goes in support of its analogy of the foregoing supposition, namely, that some women exhibit a trait only paralleled in types very far beneath the level of the human race.

To recapitulate: I have tried to show—

1. That some improvement has been made from the heavy mortality seventy years ago.
2. That maternal mortality takes place quite as frequently in non-operative cases as after operation.
3. That forceps deliveries are not necessarily so dangerous as is at present being taught.
4. That if the forceps be only applied after full dilation of the os, and then as soon as their use is clearly indicated, without undue delay, the safest period has been selected.

5. That in cases in which the forceps are not indicated there is a wider scope for the practice of version than is at present believed.
6. That eclampsia, with good antenatal care, should be eliminated from our experience; but that its treatment by chloroform is a sound procedure.
7. That while there has been improvement in maternal mortality, it is still unduly high.
8. That this may be due to the presence of a hitherto unrecognized factor.
9. That this factor may be described as a reversion in the parturient woman to certain types of organism in which there is a tendency to death after fulfilment of the sexual function.

A doctor in general practice is more concerned with practical bearings than with scientific explanations of a theory. What, then, would be the influence of this as a working hypothesis? This, that the pregnant woman must be regarded as one who should be studied from a different angle. Rather than look on her as simply a normal person who has become pregnant, she should be regarded as a woman in danger of her life from toxæmias either endogenous or exogenous. Whether the bacteriologists can give us one or more vaccines to use as prophylactics we cannot say. There may be some hope that way. In any case, two thoughts should be in the mind of anyone who means to assume the responsibility of conducting a maternity case:—

First—That this woman stands in danger of death, if not protected from it by every means that antenatal care can give her;

Second—That her confinement, whether normal or not, must be conducted on the lines of a major surgical operation.

and—

It is worth it.

STATISTICAL TABLES.

Mortality, Maternal, and Fœtal, per 1,000.

	1st Series (936) 1848-1864.	2nd Series (550) 1880-1891.	3rd Series (1670) 1891-1923.
Maternal—			
Operation	4 } = 20 = 21	2 } = 6 = 10	2 } = 5 = 3
Non-operation	16 }	4 }	3 }
Fœtal—			
Operation	4 } = 17 = 18	11 } = 25 = 40	38 } = 56 = 33
Non-operation	13 }	14 }	18 }
Septic Mortality	17	7.2	1.7

Forceps Operation Mortality.

	Cases.	Deaths.	Fœtal Deaths.
Forceps—			
Primigravida -	192	1	10=5.2 per cent.
Multipara - -	201	1	6=2.9 per cent.
Totals - -	393	2	16=4.07 per cent.
		=0.05 per cent.	

General Operation Mortality.

Operation.	1st Series (936) 1848-1864. Number.	Maternal Death.	Fœtal Death.		2nd Series (2200) 1880-1923. Number.	Maternal Death.	Fœtal Death.
Forceps - - - -	21	1	0	...	393	2	16
Pelvic presentation - -	9	1	0	...	35	0	8
Placenta prævia - -	5	0	0	...	15	0	3
Retained placenta - -	3	1	0	...	40	0	0
Post-partum hæmorrhage	4	0	0	...	11	0	0
Accidental hæmorrhage -	0	0	0	..	8	0	4
Twin births - - -	10	1	0	...	28	0	0
Eclampsia - - -	3	0	0	..:	10	2	4
Prolapse of cord - -	3	0	0	...	4	0	2
Craniotomy - - -	2	0	0	..	1	0	1
Monstrosities* - -	2	0	2	...	11	0	11
	60	4	4	...	557	4	49

* Hydrocephalus 2
Anencephalus . . . 7
Exomphalos 2

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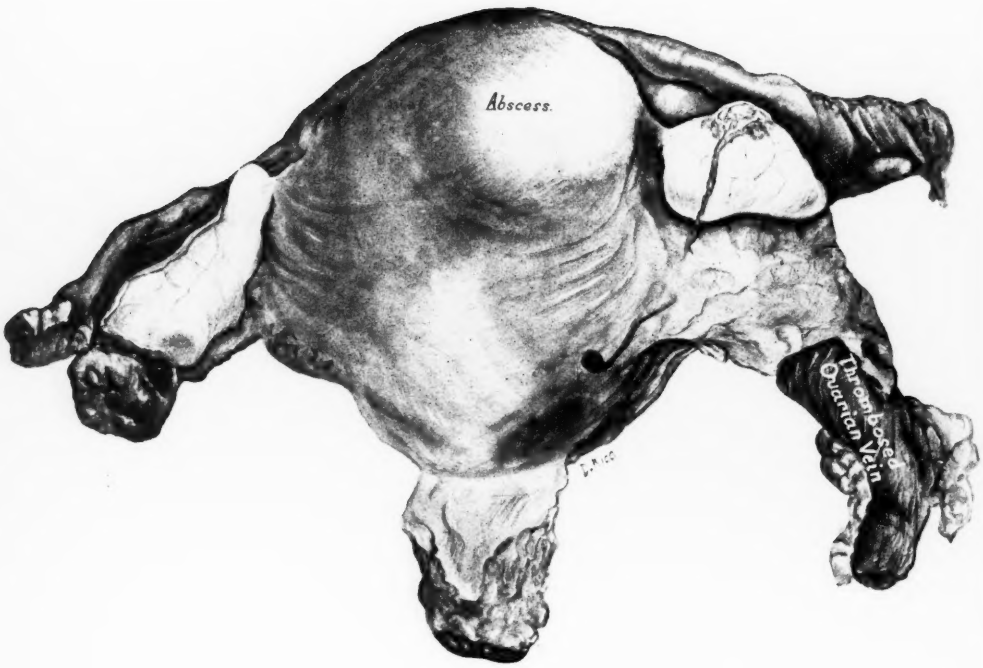

Fig. 1.

Specimen removed at operation.

In the posterior wall of the fundus uteri there is an abscess. The ovarian vein on the right side is completely thrombosed.

CLINICAL REPORTS.

Puerperal Ovarian Thrombophlebitis with Abscesses in the Wall of the Uterus.

Professor W. BLAIR BELL, M.D., B.S. London.

(From the Department of Obstetrics and Gynæcology University of Liverpool).

THE principal point of interest in connection with this case is the fact that the specimen illustrated in figs. 1 and 2 was not obtained *post-mortem*, but was removed by operation with complete recovery of the patient.

The following is the history of the case :

Mrs. T. L., æt. 29, iii-para, had been confined fourteen days before I was asked to see her. Parturition was said to have been perfectly normal. On the ninth day the evening temperature was found to be 102°F. Two days later the doctor in attendance performed curettage with a sharp curette. Afterwards the uterus was washed out with a weak solution of iodine. Shortly after this the patient had a severe rigor. Subsequently the temperature ranged between 98.4 and 103°F.

On examination I found the uterus to be quite mobile, but not well involuted.

I had the patient brought to Liverpool, and the same night, after taking a swab from the uterine cavity, from which streptococcus longus was subsequently grown, I inserted a double tube, through which the uterus was washed out at frequent intervals with a strong hypochloric solution.

In spite of this treatment the patient did not do well. The temperature varied from 99°F.—105°F. and the pulse from 108—132 until the nineteenth day after parturition. On the twenty-first day the temperature rose to 105.6°F. and the patient had a severe rigor; a few hours later the temperature was found to be 96.4°F., but it rapidly rose again to 103°F.

Vaccines were given, and were followed by some reduction in the height of the temperature which now became definitely hectic without rising above 102.4°F.

On the thirtieth day after parturition I thought I was able on bimanual examination to detect a sausage-shaped swelling at the top of the right broad ligament; so, making a diagnosis of ovarian thrombophlebitis, I decided to operate, and this I did on the thirty-first day after parturition, on what was reckoned to be the twenty-second day of the infection.

I removed the uterus with both appendages, and the thrombosed ovarian vessels on the right side to a point beyond the thrombus, the rounded end of which could be clearly felt. An ovarian graft was made in the right rectus muscle.

The temperature settled immediately, with a maximum evening temperature of 100°F. until the sixth day after operation, when 102°F. were registered. Two days later a small quantity of pus was evacuated from the laparotomy-wound, which did not break down. The temperature dropped, to rise again on the thirteenth day after operation to 102° F.; but we could find no cause for this, and after three days the temperature finally became normal, and the patient made an excellent recovery.

As already stated, it is only very rarely that such extensive puerperal lesions are encountered during life and successfully treated by operation. In the *post-mortem* room specimens of this kind are not very uncommon.

Comment.

This case, taken in conjunction with some experience of the beneficial results that may follow ligation and excision of thrombosed ovarian veins, the result of puerperal sepsis, leads me to wonder whether surgical intervention is too infrequently practised in this type of puerperal infection in which some attempt to combat the spread of the infection, usually with only temporary effect, is made by the patient's own protective mechanisms—blood-clotting, leucocytosis, and the rest—without which nothing appears to be of any avail: the patient always succumbs.

Fig 2.

An antero-posterior sagittal section has been made through the body of the uterus to show the abscess cavity in the posterior wall.

Fig. 1.
Muscle tissue removed manually from uterus during exploration.

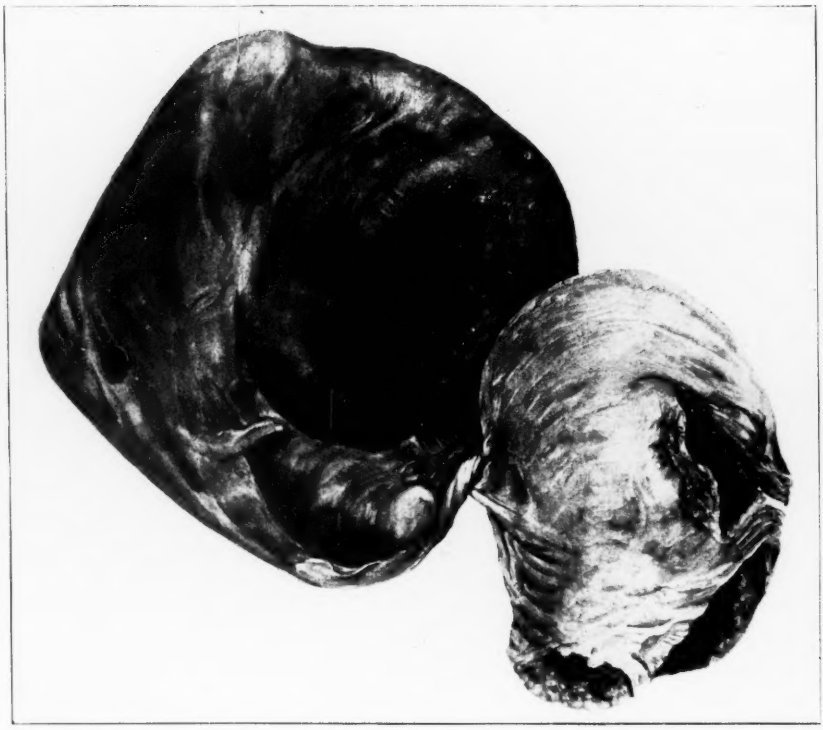

Fig. 2.
Specimen removed at operation.
The perforation through the right side of the uterus is clearly seen. The ovarian cyst, which at the operation was found directly in front of the uterus, has been displaced to one side to display the twisted pedicle. The cyst itself has become shrunken during fixation.

Manual Rupture of the Puerperal Uterus.

Professor W. BLAIR BELL, M.D., B.S. (Lond.).

(From the Department of Obstetrics and Gynæcology, University of Liverpool).

So far as my own experience extends this case is unique. Moreover, much to my surprise, I have come across no similar case in the literature.

Manual perforation of the puerperal uterus has, unfortunately, not infrequently been recorded, and doubtless there have been many unrecorded instances. In this particular case the point of interest lies in the pathological state of affairs that was indirectly the cause of the hand being passed through the uterine wall.

History of the Case. G. M., æt. 24 years, a primipara, was delivered of a living male child by a midwife on March 7th, 1924. The membranes were said to have been " ragged ". On the second day the temperature rose, but there is no record of the degree of fever. On March 12th the patient experienced a sudden attack of severe abdominal pain. This was accompanied by a further rise in the temperature and in the pulse-rate. The lochia was offensive. She was then for the first time seen by a doctor, who sent her to the local Hospital " in a state of collapse ". Her illness was attributed to puerperal sepsis with pelvic peritonitis.

On admission, the temperature was found to be 101°F.; on the following afternoon it rose to 102°F. Intra-uterine douches and injections of infundibular extract were given. The temperature gradually dropped, but on March 19th it had again risen to 101° F.

Perforation of the uterus. On this day the doctor in charge came to the conclusion that the uterus should be explored. He passed his hand into the uterine cavity and tried to reach what he took to be the enlarged fundus uteri, upon which a nurse pressed from above.

A quantity of tissue believed to be placental, but which on histological examination was found to be uterine muscle (fig. 1) was removed. Further attempts to reach the 'fundus' resulted in the hand being passed through the posterolateral wall of the uterus on the right side: as the doctor expressed himself, he found he was " shaking hands with intestines ".

Operation. I was then asked to see the patient, whom I found

in a condition of considerable shock. In view of her bad condition and the clearness of the history I did not examine her, but proceeded immediately to perform laparotomy.

The supposed 'fundus,' on which the nurse had pressed, and into the interior of which the doctor had endeavoured to pass his hand, proved to be an ovarian cyst of the same size as that of a full-time fœtal head, with torsion of the pedicle (fig. 2). The cyst was lying partly in the pelvis and partly in the hypogastrium *in front of the uterus, and resting on the fundus of the bladder.* Light adhesions to the surrounding structures were present. When the cyst had been delivered a large rent was observed in the uterine wall. There were a few ounces of blood in the pouch of Douglas.

The uterus was rapidly removed by low supravaginal hysterectomy, together with the appendages on the left side. It was not possible to identify the termination of the soft, dilated cervix. The abdomen was closed without drainage. A pint of saline was administered intravenously.

Progress of the case. After a somewhat stormy convalescence in regard to the temperature, the patient made a good recovery, the laparotomy wound healing by first intention.

Comment. There is no doubt that the patient suffered with puerperal sepsis, and that torsion of the pedicle gave rise to superadded acute symptoms.

In the belief that products of conception were retained the doctor made an attempt to remove them, and removed fragments of the muscle wall of the uterus, thereby weakening it. The position of the cyst in front of the uterus led him to believe it was the fundus of the subinvolved uterus, and as a result of this, and possibly owing to the thinning of the muscular tissue, he passed his hand through the uterine wall. It appeared to me that such an accident might easily happen in the circumstances as I found them.

Perineal Hæmatoma during Labour.[1]

By Wm. Fletcher Shaw, M.D., Ch.B. (Victoria),

Lecturer in Obstetrics and Gynæcology, Manchester University; Hon. Assist. Gynæcological Surgeon, Manchester Royal Infirmary; Hon. Assist. Surgeon for Women, St. Mary's Hospitals, Manchester.

Mrs. L., age 39, full-time primigravida, commenced with abdominal pains during the night but, as these were very irregular and tended to diminish rather than increase, and as she had been standing out in the cold the previous evening, they were thought to be due to a chill, and the doctor was not called until next morning. The pains then became more regular, and at 9.0 a.m., when the first examination was made, the cervix admitted one finger. The nurse arrived before noon and found the cervix only a little further dilated, so made preparations to give an enema; but when she examined the patient with the intention of administering the enema she found a distinct blue swelling round the anus to which she called the doctor's attention a short time later. The swelling was then not very large, so the nurse was instructed to give the enema and this was duly done with a satisfactory result, and without causing pain to the patient. Later in the afternoon the patient seemed very cold, and collapsed, and was put back to bed by the nurse and husband, but she had quite recovered when the doctor called about 6 p.m.; to his surprise, he found the swelling now greatly distended the whole of the perineum, and as he could not find any cause for this, asked me to see her.

At 7.30 p.m., when I first saw the patient, the perineum was tightly distended by a blue-black swelling which extended round the anus and posterior part of the vulva into the ischio-rectal fossa on each side, and the recto-vaginal septum was very much thickened and hard and a good deal of blood-stained mucous came from the rectum after examination.

I did not make a vaginal examination because of the difficulty of doing so with complete aseptic precaution through this very swollen vulva, and both the doctor and myself advised Cæsarean section as we felt sure the child's head would cause severe laceration of this greatly distended tissue, and this would probably be followed by very extensive sloughing.

1. Read before the North of England Obstetrical Society, April 1924

The urine contained a slight amount of albumin, and had been found to do so a few days previously, but the amount was so slight and transient that it was not thought to be of any clinical significance.

The same evening I delivered a living male child by Cæsarean section.

On opening the abdomen I found there was a considerable quantity of reddish-brown fluid in the peritoneal cavity, a hæmatoma, the size of a tangerine orange, in the right broad ligament, and the right side of the bladder wall was quite black, not much thickened, and there was no suggestion of gangrene. When the uterus was incised it bled quite freely, and there was nothing else abnormal to be noted at the operation.

The next day the patient seemed very well. The swelling in the perineum was considerably reduced in size; the temperature and pulse were normal, flatus was passed but no fæces, and it was necessary to pass a catheter to empty the bladder; the urine was blood-stained and contained a small quantity of albumin.

Third day.—After administration of calomel, pituitrin and eserine, some pieces of hard fæces were evacuated with a turpentine enema, and later in the evening the patient had an involuntary motion in the bed.

Fourth day.—Patient still remained quite well and passed flatus freely, but we found it impossible to get another evacuation of the bowel. Though the urine had still to be drawn by catheter it was now quite clear. This evening the temperature rose to 100 and the patient exhibited mental symptoms.

Fifth day.—The patient was quite free from mental symptoms, but her general condition was not so good; the pulse-rate increased to about 120 and no flatus or fæces were passed, although sulphate of magnesia, pituitrin and eserine and enemata were given. The amount of urine passed was much diminished.

At this stage it was very difficult to decide whether there was general peritonitis, and whether the abdomen should be opened or not, but I decided against this as there was no rise of temperature, no further increase in the pulse-rate, little abdominal distension, no rigidity and no sickness. The progressive atony of the intestinal muscle and suppression of urine were more suggestive of a mesenteric lesion: this decision was confirmed by a surgical colleague, Mr. Douglas, who kindly saw her for me, and independently we came to the conclusion that she was probably suffering from mesenteric thrombosis.

Sixth day.—The patient was very much worse; the face had shrunk and assumed the typical abdominal type; pulse 112, temperature normal; no flatus or fæces passed this day, and the

perineum and lower end of the rectum and vagina had formed a large slough. The urine still had to be drawn by catheter and again contained blood. During that night the patient became comatose and died early the next morning.

Unfortunately, a post-mortem examination could not be made, and so it was impossible to confirm or disprove the diagnosis of mesenteric thrombosis.

This is the only case I have seen of hæmatoma in the vulva during labour without a history of trauma, nor can I find any in English literature apart from two cases published by Dr. A. B. Danby in the last Transactions of the Obstetrical Section of the Royal Society of Medicine.[1]

These cases were very similar to mine—both were primigravidæ over 30 years of age, both had a slight degree of albuminuria, and in one the hæmatoma developed at the commencement of labour, as in my case, though in the other it developed only 15 hours after labour. In both these cases the patient was delivered *per vias naturales*, so the condition of the broad ligaments was not seen, but there seems no doubt that a hæmatoma formed in the broad ligament of the second case.

The third of Dr. Danby's cases is one of accidental hæmorrhage with hæmatoma in the broad ligaments, and albuminuria, and assuming that this condition is now generally accepted as being due to a toxæmia, he argues that the hæmatoma of the vulva and perineum is probably due to the same cause.

This seems a very reasonable explanation, and my case seems to add further weight to his argument, although the albuminuria was so slight that I did not, at first, think it to be of much clinical significance.

In 1916 I read a paper before the Obstetrical Section of the Royal Society of Medicine[2] on "Six cases of accidental hæmorrhage with extensive hæmatomata of the broad ligaments, all associated with marked albuminuria," and suggested that the condition was due to a toxæmia. In the discussion which followed the majority of the members agreed that toxæmia was the most probable cause of accidental hæmorrhage, though a few would not accept the statement that all cases of accidental hæmorrhage were due to this cause.

In 1920, Gordon Ley, in a valuable paper on Accidental Hæmorrhage, based upon fifty consecutive cases, came to the conclusion that a toxæmia was the causative agent and trauma played no part in it. The great majority of his patients had albuminuria which disappeared after delivery and many of them exhibited other symptoms of toxæmia.

If toxæmia produces hæmorrhage into the broad ligaments,

there seems no reason why it should not do so in the vulva and mesentery where, also, the blood vessels are loosely supported, and this case of mine, with hæmatomata in the broad ligament and in the bladder wall as well as in the vulva and perineum, associated with albuminuria, a toxæmia would seem to be the most likely cause of the condition.

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Traumatic Separation of the Symphysis Pubis during Delivery.

By A. E. Chisholm, M.B., Ch.B. (Edin.), F.R.C.S. (Edin.),
Assistant Obstetrician and Gynæcologist, Royal Infirmary, Dundee.

An unusual accident, causing considerable alarm, but fortunately ending fairly satisfactorily, took place in the case here reported.

The patient was an unmarried woman aged 27. When I first saw her she was pregnant and near the time for her delivery.

Pelvic measurements:—Interspinous, 24 cms.; intercristal, 26 cms.; external conjugate, 20 cms.

It will thus be seen that, from the point of view of external measurements, the pelvis was of good size.

The head, felt above the brim, was not engaged. The fœtal heart was not definitely heard at first, although there was a suspicion of it on the left side. The exact position could not be determined by palpation.

Labour pains commenced about 1 p.m. on June 7, 1923. The membranes were said to have ruptured before that time, but the accuracy of this would appear to be doubtful. Progress was exceedingly slow and the dilatation of the *os* was very gradual.

By June 9 the pains were continuing somewhat irregularly, the head was engaged, and there was no overlapping. The *os* admitted only one finger and progress seemed to be suspended. The patient was tired but not exhausted, and her general condition was satisfactory. There was neither tetanic contraction of the uterus nor true inertia.

By the morning of June 10 very little progress had been made. At 1.30 p.m. morphia gr. $\frac{1}{4}$ and scopolamine gr. 1/100 was given in the hope that the patient might be eased of her pain. Scopolamine gr. 1/400 was repeated at 5 p.m. and 8 p.m. At 11.45 p.m. morphia gr. $\frac{1}{6}$ and scopolamine gr. 1/200 was given. The effect of this was only partial. The treatment was discontinued. The fœtal heart was heard at 5 p.m. During all this time progress was being made and, though slow, there was no justification for performing Cæsarean section, the pelvic measurements being good, and the head being in the pelvis.

Next day, June 11, after a restless night, the patient was taken to the Maternity Hospital. By this time the cervical dilatation had

distinctly increased, and one felt that aid must be given in spite of the fact that full dilatation of the *os* had not quite been reached. Therefore about 2.30 p.m. I applied the forceps, the House Surgeon administering the anæsthetic. But the head would not advance. Being somewhat fatigued by my vain efforts, I asked the House Surgeon to try what he could do. He was a lusty and muscular youth and, putting forth his strength, made the head move downwards almost at once, but at the same time there was heard an ominous crack. There were also signs of laceration of the soft parts. The head was carefully delivered, a double episiotomy being done, as a laceration of the perineum into the anal canal seemed imminent. The baby, weighing 6 lbs. 4 ozs., was dead and its delivery was followed by much meconium.

The damage done was sufficiently disconcerting, and made one feel distinctly anxious. There was a separation of the symphysis pubis with a wide laceration of soft parts communicating with the bony gap, so that this part of the injury was of the nature of a compound fracture. The track of this laceration was on the right side of the urethra. The urethra with the surrounding tissue was displaced downwards, and to the left there was a laceration of the left side of the cervix right up to the left fornix. A severe median tear of the perineum was only prevented by the double episiotomy already referred to. The reason for the dystocia was that the head was in the persistent L.O.P. position.

The track leading to the symphysis was packed with flavine gauze, the cervix and the perineum were stitched with catgut, and the patient was carefully treated and kept in hospital for about a month. She had an irregular temperature for a time, the highest reading recorded being 101.8° on one occasion. A good deal of sepsis and some sloughing of soft parts ensued, but eventually the sepsis disappeared and the raw areas granulated over. There was some retention of urine necessitating catheterization. Cystitis developed, but this rapidly responded to treatment by lavage. For a time there was tenderness over the symphysis.

By July 10, 1923, the patient could stand and walk a few steps with support. A few days later she could walk fairly well and tenderness over the pubis had gone.

The reason for refraining from craniotomy was that one could not be sure the child was dead. The fœtal heart sounds had seldom been heard, and then very faintly, because of the position of the child and, possibly, because the fœtal heart may have been feeble. The reasons for refraining from Cæsarean section have been given. It is true that symphysiotomy might have been done, but it is obvious that the forceps should in any case have been tried first. To leave the case to nature any longer was out of the

question. The patient had had quite enough fatigue and, besides, it is a question if the natural expulsive forces would have been equal to the task.

The fœtus was examined from a pathological point of view by Dr. Christine Thomson and, from the findings, she suspected syphilis. The patient herself showed no signs of such a disorder. I had the opportunity of examining her again in April, 1924, and at that time I drew off blood for a Wassermann test. The result showed a negative reaction. Local examination at this time was distinctly interesting. The bony measurements were exactly as before. It was difficult to be sure of feeling any gap between the pubic bones. An X-ray photograph shows that there is a break in the normal line of the upper edges of the pubic bones in the region of the symphysis, but there is very little, if any, widening of the symphysis itself and union seems to be perfect. The tear leading up by the right side of the urethra to the symphysis is represented by a deep epithelialized sulcus, the urinary meatus being eccentric and displaced to the left. There is a slight degree of cystocele but no rectocele, although the perineum is very deficient. There is much cicatrisation in the vaginal vault. There is neither urinary nor rectal trouble.

The patient looks well and walks perfectly. She puts in a full day's work as a tailoress, and seems to be not at all inconvenienced by her somewhat alarming experience.

In this case the likelihood is that traction was not made in the axis of the pelvis but that the pull was forwards as well as downwards, thus levering the head with considerable force against the back of the symphysis in a forward direction.

The following is taken from the *Medical Annual*, 1915.

"Tuley (*Amer. Journ. Obstet.*, 1913, ii, 152), in recording a case of this rare condition, gives exhaustive references to the literature and the views of various authors as to the causal factors. In the case recorded, traction had been applied to an unreduced occipito-posterior presentation, and this proving unsuccessful, the case was sent to hospital, where the head was pushed up, turned forward, and delivered with forceps. It was not definitely determined when the accident occurred, as it was only afterwards, when attempting to control hæmorrhage which was localized to lacerations in the region of the urethra, that it was discovered that a space of at least $2\frac{1}{2}$ inches existed between the two pubic bones. The only treatment consisted in strapping the hips, and the patient eventually recovered and walked well.

There have been 134 cases recorded, and in the vast majority the condition follows upon delivery with the forceps, especially the high operation in small pelves. In a discussion which ensued,

several members recorded their experiences, which went to show that the condition was much commoner than the literature of the subject might suggest, and also that the ill effects were trivial in the majority of cases."

I have Dr. Buist's permission to mention another case of ruptured symphysis pubis which occurred in the Maternity Department in May of this year (1924).

Labour had been very slow. The head being in the pelvis and the cervix being dilated, the House Surgeon delivered with the forceps. Only a slight tear of the perineum was noticed at the time. Later a hæmatoma developed over the symphysis pubis and there was tenderness on pressure. An X-ray photograph showed a separation of the symphysis pubis. The hæmatoma became septic and had to be incised. There was some pyrexia, but the patient apparently made a satisfactory recovery. The child was alive and mature.

Review of Current Literature.

DIRECTOR: FRANK E. TAYLOR,
M.D., B.S. (Lond.), F.R.C.S. (Eng.), M.R.C.P. (Lond.), D.P.H. (Cantab.)

THIS Review will contain the lists of contents, and abstracts of the more important articles, from the following journals, with which the "Journal of Obstetrics and Gynæcology of the British Empire" exchanges:—

British.—The Lancet; British Medical Journal; The Hospital and Health Review Medical Science: Abstracts and Reviews.

Canadian.—The Canadian Medical Association Journal; Bulletin Medical de Quebec.

Australian.—Medical Journal of Australia.

South African.—Medical Journal of South Africa.

American.—American Journal of Obstetrics and Gynæcology; The Journal of the American Medical Association; Surgery, Gynæcology and Obstetrics

French.—La Gynécologie; Gynécologie et Obstétrique; Bulletin de la Société d'Obstétrique et Gynécologie de Paris; Revue de Gynécologie et de Chirurgie Abdominale.

Belgian.—Bruxelles-Médical.

Italian.—Annali di Ostetricia e Ginecologia; Archivio di Ostetricia e Ginecologia.

German.—Zeitschrift für Geburtshülfe und Gynäkologie; Archiv für Gynäkologie; Zentralblatt für Gynäkologie; Monatsschrift für Geburtshülfe und Gynäkologie; Münchener Medizinische Wochenschrift.

Scandinavian.—Acta Gynecologica Scandinavica.

South American.—Boletin de la Sociedad de Obstetricia y Ginecologia de Buenos Aires.

It is hoped that the Review of Current Literature will keep the readers of this Journal in touch with current work throughout the world. At the end of each year it is proposed to print an Index of all the subjects contained in the articles of the above journals. Arrangements will also be made to include abstracts of important articles on border-line subjects, such as Physiology, Biology and Biochemistry.

LIST OF ABSTRACTORS.

London: J. R. FORREST, DOROTHY N. L. LEVERKUS, M.B., F. E. TAYLOR, F.R.C.S.
Huddersfield: W. E. CROWTHER, M.B.
Leeds: A. GOUGH, F.R.C.S.
Liverpool: ROBERT A. HENDRY, F.R.C.S.
Sheffield: W. W. KING, F.R.C.S.
Glasgow: JANE H. FILSHILL, JAMES HENDRY, M.D.
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Lancet.

July 5, 1924.

Midwives and jury service. (Annotation.)
Maternal mortality. (Medical News.)

July 12, 1924.

*On an improved prophylactic method of treatment of eclampsia. H. B. Strogonoff.

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Effect of X-rays upon the pregnant myomatous uterus. (Special article.)

July 17, 1924.

*Glandular activity in the human fœtus. M. F. L. Keene and E. E. Hewer.

*A case of "congenital" occlusion of the common hepatic duct in a twin baby, with an indirect van den Burgh reaction. W. M. Feldman and M. A. Lawson.

July 26, 1924.

The assessment of fœtal age. (Annotation.)

August 9, 1924.

*Changes in the polarity of the fœtus during the later weeks of pregnancy. A. L. McIlroy and D. Leverkus.

Development of the vagina. (Annotation.)

August 16, 1924.

The hour of birth. (Annotation.)

A new intra-uterine forceps. J. H. Robinson.

August 23, 1924.

Fertility and sterility in domestic animals. (Annotation.)

*The treatment of marasmus in infants. L. G. Parsons.

An improved prophylactic method of treatment of eclampsia. Strogonoff states that patients in most cases die from the destructive action of the fits upon the heart, respiratory centre, etc. Therefore the fits must be repressed. Eclampsias sub-graviditate and sub-partu are treated with equal energy. Post-partum eclampsias usually require smaller doses of narcotics, but when extremely severe require maximum doses. During the fits the patient should be protected against injuries, the tongue protected against bites, and oxygen should be given after fits to remove asphyxia. Chloroform is harmful in typical fits. Remove all irritations, and administer morphine and chloral hydrate according to the following scheme:—

The beginning of treatment: $\frac{1}{4}$ gr. ($\frac{1}{6}$—$\frac{1}{3}$ gr.) morph. hyd. hypodermically. One hour: 30 gr. (38—22 gr.) chlor. hydr. per os or per rectum. Three hours from beginning of treatment: from $\frac{1}{4}$ gr. ($\frac{1}{6}$—$\frac{1}{3}$ gr.) morph. hyd. hypodermically. Seven hours: as at one hour. Thirteen hours: 22 gr. (15—30 gr.) chlor. hydr. Twenty-one hours: 22 gr. (15—30 gr.) chlor. hydr. Dose increased in severe eclampsia in the case of strong individuals, and diminished in mild forms. When patient is conscious chloral hydrate is introduced per os, and in unconscious condition per rectum with milk and physiological salt solution. During the first two intervals chloroform 10—20 minims is frequently administered in the presence of prodromata of a fit. On the second day undelivered patients receive 15—22 gr. chlor. hyd. t.i.d. In the absence of fits during 14 hours and when the patient is in good condition the dosage may be diminished. If the fit recurs two or three times, or even once in severe form, in spite of administration of morphine and chloral hydrate, it is necessary to perform venesection, drawing off 400 ccm. of blood. This is not resorted to if delivery is expected within the next 1—2 hours.

As soon as the eclamptic patient can be delivered without harm to

herself and child, delivery is undertaken, either with forceps, by extraction, or rarely, by version. In the absence of contra-indications the membranes are ruptured when the os has dilated to two fingers in a multigravida and to three fingers in a primigravida.

The regular functions of the chief organs—kidneys, skin, lungs and heart—are maintained.

Patients admitted from outside after six or more fits immediately undergo narcotic treatment and venesection. Continuous observation of patient and child during the first 24 hours after delivery. In very severe cases 135 gr. chlor. hydr. and $\frac{2}{3}$ gr. morph. hyd. are introduced in the course of 14 hours (the administration of narcotics is much more frequent than is shown, until the fits cease) plus chloroform narcosis several times. The forerunners of a fit are: increase of headache (which is recognized in unconscious patients by the expression of the face and restlessness in bed), convulsive contractions, dimming of vision, and especially increase in blood pressure.

In the figures obtained by this method of treatment Strogonoff finds justification for Fürst's statement: "In the statistics of the whole literature these favourable results stand out unsurpassed."

Glandular activity in the human fœtus. Keene and Hewer found that (1) the fœtal kidney begins to function at about the eleventh week of development; (2) the fœtal liver is functioning as an excretory organ at twelve weeks; (3) the fœtal gastric mucosa contains pepsin at sixteen weeks, but no HCl even at full term; (4) the fœtal pancreas contains both trypsin and trypsinogen at sixteen weeks, while pancreatic amylase is present at twenty-four weeks, and pancreatic lipase at thirty-two weeks; (5) intestinal ferments are not present at thirty-two weeks, but enterokinase is present at sixteen weeks, and mucin at eight weeks; (6) the fœtal pituitary contains an active principle at eight weeks; (7) the fœtal thyroid is producing colloid-like secretion at eleven weeks; (8) the fœtal suprarenal contains adrenin at sixteen weeks, but does not give a chromaphil reaction until very much later.

"Congenital" occlusion of the common hepatic duct. In recording a case with post-mortem findings Feldman and Lawson consider that the obliteration in this, and probably in all other cases in which the jaundice is not evident at birth, or within a couple of days after birth, is due to *post-natal* toxic absorption from the navel, and that such cases should not be described as *congenital*.

Changes in the polarity of the uterus during the later weeks of pregnancy. The investigations of McIlroy and Leverkus have not clearly disclosed the factors which influence pelvic presentations. Deformities of the fœtus can be eliminated, and the length and weight of the fœtus or the length of the umbilical cord have little value in determining or preventing spontaneous version. Deformities of the pelvis and excess of liquor amnii are not of much moment. In a considerable number the occiput failed to rotate to the front early in labour, many requiring manual rotation. The influence of placenta prævia and of globularity of the uterus were difficult to estimate. Prematurity is closely associated with pelvic presentations at delivery owing to the onset of labour occurring before the fœtus has had time to right itself by spontaneous version.

While abnormal presentations can, in some cases, be assigned to specific causes, no reason can be assigned for the majority. Why a fœtus which starts with a vertex presentation should be spontaneously transposed into a breech presentation, or one starting as a breech should be spontaneously transformed into a vertex, or why a vertex should become a breech, or why a vertex should become a breech and then be re-transposed into a vertex, is at present an inscrutable mystery.

In most instances nature may be trustel to do what is needful. If, however, spontaneous version is delayed beyond the thirty-sixth week, it is usually wise to resort to version. It may be necessary to perform version in some cases of pelvic presentation in order to estimate the relation of the fœtal head to the diameters of the maternal pelvis.

These investigations show the value of ante-natal work. It is only by careful and continuous examination of the pregnant woman from an early stage that we can hope to discover the causes leading to obstetric abnormalities—a prolific cause of morbidity and death in childbirth.

The treatment of marasmus in infants. Marasmus may be primary, a " vice of nutrition " only; or secondary to some other disease. Disorders of digestion are not infrequent, and may be classified into (1) fat indigestion, (2) carbohydrate indigestion, (3) protein indigestion, (4) pyloroplasm, and (5) diarrhœa and vomiting.

The vitamine content of the diet is of great importance both in the production of marasmus and in its treatment. Fat, fruit juice and marmite can supply the necessary vitamines.

The use of " acid milk " has certain advantages in the treatment of marasmic infants over three months of age. The buffer value of cow's milk is high and may be neutralized (1) by extreme dilution, (2) by drying milk, and (3) by the addition of acids—hydrochloric, citric or lactic. Cow's milk may thus be given almost the same hydrogen-ion concentration as breast milk. F E.T.

British Medical Journal.

July 5, 1924.

Post-anæsthetic vomiting: an attempt at prevention. E. H. P. Cave.
Contagious bovine abortion and undulant fever. (The Week.)
Radium treatment in gynæcology. (The Week.)
True hermaphroditism. (The Week.)
Infant welfare conference. (The Week.)
Acute puerperal inversion of the uterus. J. Finnegan. (Correspondence.)

July 12, 1924.

Cæsarean section. E. F. Murray.
Strangulated hernia in an infant of three weeks. F. A. H. Simmonds.
Infant welfare conference. (General Article.)

July 19, 1924.

*Cancer of the Cervix. S. Forsdike.
Surgical emphysema due to parturition. A. W. Hansell.
Milk acidified with lemon juice. (The Week.)

August 2, 1924.

A municipal convalescent home for mothers and babies. (The Week.)
Post-anæsthetic vomiting. R. H. Paramore. (Correspondence.)
Lymphaticostomy in peritonitis. A. Mitchell. (Correspondence.)

August 9, 1924.

*Posture in difficult labour. D. C. Buist.

Pseudo-hermaphroditism. J. Gutch.

August 16, 1924.

*Discussion on methods of the ante-natal clinics and their application to private practice :—

1. Opening paper. J. A. Willett.
2. Ante-natal methods in rural practice. E. K. Mackenzie.
3. Maternity work among soldiers' wives. E. L. Moss.
4. Discussion. R. Adamson, A. Bourne, A. F. Martin, T. H. Richmond, R. W. Johnstone, F. Edge, M. E. Mackenzie, J. M. Campbell, and J. S. Fairbairn.

Acute œdema of the cervix during puerperium. J. T. L. Forbes.

Ante-natal care in private practice. (Leading Article.)

August 23, 1924.

Vaginal occlusion : urinary calculus; Cæsarean section. H. E. K. Fretz.

Anti-rachitic action of milk. (The Week.)

August 30, 1924.

*Some suggestions in the treatment of puerperal sepsis. J. R. C. Canney.

*Occlusion of the os following surgical treatment of uterine and vaginal prolapse. J. Nigel Stark.

Cæsarean section for placenta prævia. H. Evers.

Cancer of the cervix. In this Hunterian lecture Forsdike discusses the subject of cancer of the cervix and concludes :—

(1) That for cases of carcinoma clinically limited to the cervix the only treatment is operative.

(2) That for cases which clinically have invaded the peri-cervical tissues the treatment is by radium to the cervix and X-rays to the pelvic tissues.

(3) That salts of copper play an important though subsidiary part in treatment by radium.

(4) That pre- and post-operative irradiation is of considerable value.

Posture in difficult labour. Buist affirms that most of the postural devices by which we reduce the difficulty of labour have been practised, at least in kind, for thousands of years, as evidenced by the writings of Ætius, Soranus, Eucharius Rösslin, Scipio Mercurio, Severinus Pinæus, Ambroise Paré and Walcher. Used at first empirically and promiscuously, the mode of operation of most of them has been made clear and the indications for them precise, and it is now possible to employ them scientifically.

Methods of the antenatal clinic and their application to private practice This discussion at the annual meeting of the British Medical Association was opened by Willett, who confined his remarks to the clinical aspect, dealing in the first phase—from conception to viability of the child—with the major complications of pregnancy, viz., vomiting, abortion, syphilis, gonorrhœa, tuberculosis, and morbus cordis. In the second phase he discussed albuminuria and pyelitis of pregnancy; also abnormal presentations and misfits, as well as the methods of examination of the pelvis and of the fit of the head. He concludes by discussing treatment and the avoidance of emergencies.

Mackenzie, discussing ante-natal methods in rural practice, believes that the contention that in general practice there is no time for ante-natal care

and that patients resent such attention is baseless. Even yet the lay mind is not fully awakened to the importance of ante-natal care, but is developing a keener appreciation of its value and a tendency to earlier engagement of the practitioner's services.

In dealing with maternity work among soldiers' wives Moss reviews four years of maternity work at the Louise Margaret Hospital at Aldershot.

An excellent discussion followed the reading of these papers.

Some suggestions in the treatment of puerperal sepsis. Canney pleads for an increased effort in combatting puerperal sepsis as soon as it appears. When fever appears in the puerperium, having excluded maladies outside the pelvis which may cause it, it is safer to give an anæsthetic and examine the pelvis than to " wait and see." If intrauterine sepsis is present explore the uterus and empty or clean it, or both. A so-called supræmia is often the precursor of virulent septicæmia, and will not be improved by leaving fragments of placenta or membranes in the uterus.

The septic uterus will not involute, but the modified Carrel-Dakin treatment, assisted by drugs, will help involution better than anything at our disposal. If antistreptococcic serum is employed, it should be given frequently until the temperature falls. Further adjuncts are " peptone shock " and intravenous eusol.

Take a culture from the endometrium and from the blood, as a vaccine may be of value. Pay careful attention to posture. Fowler's position aids drainage, whereas the supine position tends to dam back secretions. Micturition and defæcation in a sitting position are aids. In early infection of the adnexa the modified Carrel-Dakin method may possibly prevent the necessity for abdominal section, and will speed up recovery. When anæmia or debility is caused by hæmorrhage or toxæmia keep a special look-out for sepsis.

All manipulation and instrumentation should be performed with extreme gentleness; all tears of the soft parts should be sewn up immediately; asepsis should be practised most punctiliously.

Occlusion of the os following surgical treatment of uterine and vaginal prolapse. Stark records a case which shows that too thorough radical removal of the cervix in a woman of child-bearing age may be a dangerous proceeding in the surgical treatment of prolapse, and may lead to stenosis which can occlude completely the canal at the internal os and so cause retention of menstrual blood. F.E.T.

The Canadian Medical Association Journal.

Vol. xiv, No. 9, *September*, 1924.

*Effect of popular gynæcological procedures on the future child-bearing of women. J. O. Polack.

*Some aspects of post-operative treatment in gynæcological and abdominal surgery. F. McKelvey Bell.

Interpretation of symptoms in acute abdominal disease. A. Primrose.

Anæsthesia in acute abdominal disease. Wesley Bourne.

*Intravenous use of mercurochrome in an infant aged three weeks. W. G. Campbell and F. T. Cadham.

Vol. xiv, No. 10, *October*, 1924.

*An address on obstetrics during the past twenty-five years. H. M. Little.

*Congenital deficiency of small intestine. R. R. McGregor.

Effect of popular gynæcological procedures on the future child-bearing of women. Reviewing some of the common gynæcological procedures Polack points out that too many women are operated upon—many needlessly; that sterility operations give poor results and often have unfortunate sequelæ; that the gynæcological patient seldom has a complete diagnosis before operation is advised; that when possible operations in the child-bearing woman should be deferred until she has finished having children; that in the interim better obstetrics, more attention to post-partum care, and the judicious use of pessaries will keep these women comfortable; that every abdominal operation has its morbidity and is followed by some intra-pelvic pathology and a small mortality; that greater care as to indications should be used before determining on Cæsarean section; and that the gynæcologist or surgeon should have an obstetrical training before doing surgical operations on the child-bearing woman.

Some aspects of post-operative treatment in gynæcological and abdominal surgery. Bell points out the importance of pre-operative treatment for the prevention of post-operative complications, and indicates the value of blood transfusion and of testing the rate of sedimentation of the erythrocytes. He considers that there is a tendency to give cathartics too soon after operation. Before the fourth day they are of little use and cause unnecessary distress, and even on the fourth day an enema will do all that is necessary.

With regard to the incision he believes that a clear field and free access to the operative area is much more important than a small incision. All unnecessary trauma is dangerous and rough gauze pads for packing into the abdomen should be avoided. The author recommends the simple and painless form of intra-abdominal drainage which he introduced. In the prophylaxis and treatment of infection he advocates the modified Fowler's position and the use of acriflavine and the aniline dyes as antiseptics.

Intravenous uses of mercurochrome in an infant aged three weeks. In an infant aged three weeks rapid and marked recovery followed the injection of two intravenous injections of mercurochrome for septicæmia following staphylococcal infection of the umbilicus.

Obstetrics during the past twenty-five years. In this thoughtful essay appears the following paragraph :—

" Extensive prenatal care, without improvement in practical obstetrics at the time of delivery, is comparable to an attempt to improve a crop yield, with utter disregard of the most extravagant and wasteful methods at the time of reaping. Prenatal care is hopeless without some improvement in the teaching and practice of obstetrics. The most recent graduate under the most favourable conditions is not qualified to undertake the management of any but the simplest obstetrical cases, any more than to indulge in the practice of abdominal surgery. The public is sufficiently well educated to know that surgery requires special training and experience after graduation. Such is not the case in regard to obstetrics; but the public is waking up. There is only one solution: the better training of all students which will enable them to recognize difficulties and dangers; and special training of certain men, who in large centres, shall do consultation and institutional work, possibly under Government control, . . . thus placing obstetrics in a higher position both with the public and the profession."

Congenital deficiency of small intestine- A baby aged three days suffering from persistent projectile vomiting appeared normal except that the abdomen was considerably distended, coils of distended bowel being visible through the abdominal wall. A congenital blockage of the abdominal tract was apparent. Laparotomy was performed and the child died a few hours later. From examination of the intestine at the autopsy it would appear that at one time during fœtal life, possibly in the early months, the small intestine was patent throughout, and that through torsion or anæmia of the area involved, or some undetermined cause, the already normally developing intestine was pulled apart and development arrested. There were no signs of peritonitis or constricting bands in the intestine.

F. E. T.

The Journal of the American Medical Association.

Vol. 83, No. 1, *July* 5, 1924.

*Volvulus of the Fallopian tube in a case of tuberculous pyosalpinx simulating gonorrhœal pyosalpinx. J. J. Wells.

Vol. 83, No. 3, *July* 19, 1924.

*Syphilis as a complication of pregnancy in the negro: analysis of three hundred cases: results of antisyphilitic treatment; dark field examination as an aid in diagnosis of fœtal syphilis at necropsy. R. A. Bartholomew.

*When is sterilization indicated following Cæsarean section? J. B. Swift.

Vol. 83, No. 4, *July* 26, 1924.

Repetition of missed labour. W. Sawers.

Vol. 83, No. 5, *August* 2, 1924.

Cæsarean section on a true dwarf. J. W. McClaren.

Vol. 83, No. 6, *August* 9, 1924.

Gynæcology and obstetrics. F. W. Lynch.

*Pregnancy and labour complicated by diseases and injuries of the spinal cord. F. L. Good.

Vol. 83, No. 7, *August* 16, 1924.

A case of Nabothian cyst of unusual size. H. E. Happel and F. P. McNally.

*The food requirements of malnourished infants, with a note on the use of insulin. W. McKim Marriott.

*Report of a case of early rupture of fœtal membranes. M. van Cleve.

Vol. 83, No. 9, *August* 30, 1924.

*Intraperitoneal hæmorrhage from ruptured ovarian cyst. L. E. Phaneuf.

*Fate and function of the ovaries after hysterectomy. A. F. Maxwell.

*Further results of ovarian transplantation. W. L. Estes, jun.

*Prevention of sterility. D. Macomber.

The treatment of inguinal hernias in young infants. L. C. Rosenberg.

Congenital hypertrophic pyloric stenosis in twins. H. H. Davis.

Vol. 83, No. 10, *September* 6, 1924.

*Abdominal binder as substitute for pituitary extract in second stage of labour. A. C. Beck.

*Treatment of pruritus ani, vulvæ and scroti. M. P. Moorer.

Vol. 83, No. 11, *September* 13, 1924.

*Blood chemistry in pregnancy. C. W. O. Bunker and J. J. Mandell.

Water for fever in the new-born. (Editorial.)

Volvulus of the Fallopian tube in a case of tuberculous pyosalpinx simulating gonorrhœal pyosalpinx. Wells successfully removed the adnexa in this case. He points out that only fourteen cases of torsion of normal adnexa have ever been recorded, and gives the following classification :—

I. Pathologic Adnexa.
  (1) Torsion of ovarian tumours.
    A. Before puberty.
    B. After puberty.
      (*a*) In the non-pregnant state.
      (*b*) During pregnancy and the puerperium.
  (2) Torsion of tubal tumours, including hydrosalpinx, hæmatosalpinx, and pyosalpinx.

II. Normal Adnexa.
  (1) Within the abdomen.
    A. In the non-pregnant state.
    B. During pregnancy.
  (2) Within a hernial sac (not simple strangulation).

Syphilis as a complication of pregnancy in the negro. A comparison of the pregnancies of 100 non-syphilitic, untreated syphilitic and treated syphilitic patients, respectively, taken from a clinic in the south east in which at least one-third of the patients are syphilitic, showed three times as many abortions and seventeen times as many stillbirths in the syphilitic as in the non-syphilitic : prenatal treatment with an average of 1.14 gm. of arsphenamin and 0.04 gm. of mercury salicylate from an average of 7.4 months on to term, resulted in one half as many premature births, one-third as many stillbirths, one-seventh as many abortions, and one-ninth as many infant deaths up to ten days, as in the untreated cases.

The dark field examination of a suspension of liver tissue obtained at necropsy or aspirated from the liver is a valuable aid in diagnosing syphilis in babies stillborn or dying during birth, and was in agreement with the maternal Wassermann reaction in from 65 to 70 per cent. of the cases. This procedure may show the presence of spirochætes when all other evidences are lacking, but failure to find the organisms does not prove the absence of syphilis.

When is sterilization indicated following Cæsarean section? Analyzing the replies received from a questionnaire sent out to fifty members of the American Gynæcological Association, Swift draws the following conclusions :—

(1) No patient should be sterilized without the written consent of both herself and her husband after they thoroughly understand what sterilization entails.

(2) Every case presents a separate problem which must be studied carefully and to which no formula will apply; but he feels that no woman should be sterilized on her first Cæsarean section unless there are definite indications other than the possibility of a second Cæsarean section.

(3) As the successive Cæsarean sections increase, opinion tends towards suggesting and eventually urging sterilization. He believes that the maximum number of Cæsarean sections should be four.

(4) Contraceptive methods, from a medical standpoint, are not reliable for preventing pregnancy.

(5) There is no strong trend of opinion either for or against the economic factor as a reason for sterilization.

(6) He believes that a repeated Cæsarean section carries less risk than a primary Cæsarean section, always remembering that there is ever present risk of surgical intervention in the abdomen, and that a Cæsarean section must always be considered as entailing more risk to the mother than delivery through the natural passages.

(7) It is the duty of every operator to consider not only the indications for the present Cæsarean section, but the possibilities of future pregnancies.

Pregnancy and labour complicated by diseases and injuries of the spinal cord. Recording a case of labour in a patient whose spinal cord had been injured by a bullet wound and from a consideration of the literature Good shows that a patient may have the spinal cord completely severed and yet give birth to a baby normally and painlessly, and that a patient in that condition may have perfectly normal healing of the uterine and abdominal incision after Cæsarean section. He considers that the sympathetic nervous system, and not the spinal cord, controls uterine contractions.

The food requirements of malnourished infants. Marriott considers that the food requirements of malnourished infants are often extremely high, if calculated on the basis of weight. Malnourished infants often require as much total food in the twenty-hour hours as normal infants of the same age, but of much greater weight. The large amounts of food required may be safely given, provided the food is of the proper type. The nutrition may be rapidly improved by intravenous injections of glucose and insulin.

Early rupture of fœtal membranes. Van Cleve records a case of rupture of the membranes at the twenty-fifth week. At thirty-three weeks a living healthy infant was delivered by breech extraction. There was no evidence of amniotic adhesions, and no infection of cord, umbilicus or endometrium. The pregnancy began within a few weeks after an abortion, and was also complicated by a slight premature separation of the placenta.

Intraperitoneal hæmorrhage from ruptured ovarian cyst. Phaneuf finds that prior to 1900 the literature is not clear as to the hæmorrhages into the peritoneal cavity caused by ruptured follicular and corpus luteum cysts. Up to that time these hæmorrhages were not clearly differentiated from those resulting from extra-uterine pregnancy. Since 1900 the literature contains a number of case reports, each writer having met with but few cases. In most instances the diagnosis was established after opening the peritoneal cavity, a preliminary diagnosis of ectopic pregnancy or acute appendicitis having been made. A review of the literature leads one to infer that this condition, though infrequent, should be given consideration in the differential diagnosis of acute conditions of the abdomen in women.

Fate and functions of the ovaries after hysterectomy. Maxwell says that if we accept the normal menopause as a control, her analysis indicates that:

(1) The frequency of vaso-motor symptoms after hysterectomy is increased when both ovaries are removed.

(2) The frequency of symptoms with conserved ovaries after hysterectomy compares favourably with that of the normal menopause.

(3) Severe vaso-motor symptoms are more common without than with ovaries.

(4) The onset of delayed symptoms indicates that a definite number of conserved ovaries will atrophy within a year after operation.

(5) The average duration of symptoms of the normal and surgical menopause is about two and a half years.

(6) Women with low hæmoglobin are more likely to develop post-operative disturbances.

(7) The frequency of symptoms depends in large measure on the type of tissue retained.

(8) Retained healthy ovaries are not susceptible to degeneration.

Further results with ovarian implantation. In this second report Estes desires again to direct attention to the possibilities of conservative ovarian implantation, and the opportunity that it affords for permitting pregnancy as well as for maintaining menstruation.

Prevention of sterility. Macomber considers that sterility constitutes a big problem and is too important biologically and economically to be neglected. Hitherto we have treated the effects and not the causes. Macomber attempts to point out some of these effects, and to explain the causes that have produced them. More knowledge is needed, and this knowledge must be spread by the specialist to the family physician and by him to the laity. There is a growing demand among people of intelligence for more light on these matters,and it is the duty of the medical profession to supply that light and not leave this important field to quacks and charlatans.

Abdominal binder as a substitute for pituitary extract in second stage of labour. Beck considers that while the use of the abdominal binder as an aid in the second stage is not entirely without risk, its action is always within our control. In this respect it is preferable to pituitary extracts, for, if this effect is harmful, this fact can be easily learned and the condition at once relieved by either loosening or entirely removing the binder.

Treatment of pruritus ani, vulvæ and scroti. Moorer finds that under thorough infiltration of the skin and subcutaneous tissue extending one-half inch beyond the area affected, with 0.5 per cent. quinine and urea hydrochloride solution, itching is at once arrested; excoriations rapidly heal, and within a few days the skin resumes its normal smoothness and lustre. Anæsthesia, however, persists for from several days to as many weeks, and, at the expiration of this period, a second and sometimes a third infiltration may be required.

Blood chemistry in pregnancy. Bunter and Mundell began this study of the chemical examination of the blood in pregnancy with the idea that, by a systematic monthly blood examination, they might be enabled to discover some finding that would give warning of impending toxæmia, possibly before the onset of clinical evidence. They examined the blood of fifty-two normal pregnant women and of seventeen who presented symptoms of toxæmia, varying from mild toxæmia to convulsions with deep coma. Their results enable them to advance the following tentative observations: (1) Eclampsia probably does not produce any appreciative change in the blood chemistry; and (2) If, in a case of toxæmia of pregnancy, the blood shows decided nitrogen retention, either in the non-protein nitrogen or in the uric acid, it is strongly suggestive that nephritis is the predominating factor in the toxæmia. F. E. T.

Surgery, Gynæcology and Obstetrics.

Vol. xxxix, No. 1, *July*, 1924.

*The treatment of malignant diseases with radium and X-ray : I. Cancer of the cervix. R. B. Greenhough.

*Air embolism in obstetrics. J. A. Gough.

*Rupture of the uterus. D. S. Hillis.

*An adenocarcinoma and a round-celled sarcoma arising in the same uterus; report of a case with a review of the literature. T. S. Moise.

*End-results of a new " uterine shelf " operation for the relief of cystocele. H. L. Smith.

A hydrostatic reposition for prolapse of the umbilical cord. D. Monash.

Vol. xxxix, No. 2, *August*, 1924.

*Child-bearing after radium and X-ray treatment. F. A. Pemberton.

*Benign tumours of the placenta; a review of the literature and report of a chorio-angioma. R. A. Scott.

*Insulin treatment of the toxæmic vomiting of pregnancy. W. Thalhimer.

The treatment of cancer of the cervix with radium and X-ray. This elaborate and much tabulated article is the report of an American committee which has collected for analysis 1,210 case records from twenty-two hospitals. It ends with the following summary :—

(1) As a result of the study of the case records submitted to the committee certain conclusions may be drawn. We would again emphasize the fact that this is to be regarded only as a preliminary report; and that it is the purpose of the committee to collect further data and extend the time beyond the minimum period of three years, so that knowledge of the more remote end-results of these cases may be obtained. The figures available to the committee are submitted and such conclusions drawn as seem justified by the results.

(2) Of 829 cases of cancer of the cervix 94 were free from disease three or more years after treatment. More than half of these " cures " were obtained by the use of radium and X-ray without radical operation. There were no " cures " by curetting alone.

(3) In 243 cases of the early favourable and border-line cases hysterectomy alone cured one in three, with an operative mortality of one in five. Radium with palliative operation (cautery) cured about one in three, and radium alone (or with palliative operation) about one in five. Under these conditions it may be said that the choice between operation and radium in the treatment of early and favourable cases of cancer of the cervix is an open one. It is to be borne in mind that the results of treatment by radium used with the technique of the present day are not yet available, but that it is generally believed that they will be better than the figures here presented.

(4) In more advanced cases the " cures," either by radiation or by hysterectomy, were very few.

(5) The duration of life in the unsuccessful early cases is somewhat greater after radium than with operation.

(6) The formation of recto-vaginal and vesico-vaginal fistulæ occurred with nearly equal frequency with all methods of treatment.

(7) Radium, with or without X-rays or palliative operation, was the most important agency in the determination of local disease in cases which

failed to obtain a "cure." The value of radium as a palliative measure in advanced cases is beyond dispute.

(8) In the treatment of recurrent cases after hysterectomy, and in cancer of the cervical stump, radium is to be preferred to other methods.

(9) A sufficiently large dosage of radium is necessary to obtain destruction of the local lesion. The treatment of cancer of the cervix with inadequate amounts of radium should not be encouraged.

(10) A uniform classification of the pathological varieties of cancer of the cervix is much to be desired.

Air embolism in obstetrics. Gough points out that air embolism, although occurring rarely, is a grave complication of obstetrics. In the vast majority of reported cases the possibility of gas-bacillus infection has not been definitely excluded. A case is here reported in which the diagnosis, made at post-mortem, was verified by negative bacteriological findings.

Rupture of the uterus. Hillis records four cases of ruptured uterus which were admitted between February 26, 1923, and October 16, 1924, to the obstetric service in Cook County Hospital. All occurred during pregnancy; in each rupture occupied the site of a previous Cæsarean section scar. The uterus was removed in each case and all the patients recovered. Hillis summarizes his remarks on these cases thus :—

(1) The scar of the classic Cæsarean section may rupture not only during labour but at any time during the last three months of pregnancy.

(2) Two of the cases reported had fever following previous Cæsarean sections, in two the puerperium was afebrile.

(3) In these cases the location of the placenta over the scar seemed to have no influence. The sections show fragments of syncytium over the scar in two, and in two there are no signs of placental tissue in this location.

(4) Trauma may have had a place in the etiology in one case. The patient fell to the floor in a faint before the pain began. The pain, severe and sharp, was the first symptom noted in the other three cases : the uterus ruptured while the patient was asleep in bed in one case.

(5) The rupture in the Cæsarean scar often allows the uterus to empty itself completely, permitting good contraction and retraction, which stops hæmorrhage.

(6) External bleeding was not present in any of the four cases because labour had not begun and the cervix was closed. External bleeding is a very common sign in rupture of the uterus during labour.

(7) Scar tissue was present in abundance in the sections of all these cases and the line of rupture was in the scar tissue.

(8) In each of these cases the uterus was found opened by an incision in the median line of the anterior wall extending from the upper limits of the cervix to the fundus. The contraction of the uterus held the edges of the wound so far apart that they could be approximated only with great difficulty.

(9) It is believed to be good practice to remove the uterus in these cases because of the time required to freshen scar edges and the danger of a second rupture in subsequent pregnancy.

An adenocarcinoma and a round-cell sarcoma arising in the same uterus. Moise removed the uterus of a woman aged 60 complaining of vaginal bleeding. The cervix was enlarged and a clinical diagnosis of carcinoma

of the cervix was made. Examination of the tumour after removal showed a typical round-cell sarcoma of the body of the uterus in association with an adenocarcinoma. The latter tumour was atypical in that it did not present a definite focal neoplasm, but was spread over the endometrial surface in the form of minute papillæ. The picture did not suggest a true mixed tumour but would appear to be a clear-cut instance of the occurrence of a round-cell sarcoma and an adenocarcinoma in the same uterus.

End results of a new "uterine shelf" operation for the relief of cystocele. For the surgical relief of cystocele Smith employs the uterus as a support for the protruding bladder much in the way it is utilized in the "interposition" operation, but instead of turning the uterus upside down, with its fundus beneath the urethra, the organ is retained in very nearly normal position, the cervix being sutured firmly to the triangular ligament at the point at which the latter lies just below the external meatus. When secured in this position the uterus acts precisely as a shelf upon which the bladder rests, and the procedure might well be called the "uterine shelf" operation.

Smith claims the following advantages for this operation:—(1) safety; (2) permanent retention of the bladder in its correct position, supported by the uterus; (3) complete relief of symptoms in at least 95 per cent. of cases; (4) the best results are to be obtained when the uterus is supported by some sort of intra-abdominal operation; (5) a thorough repair of a torn or relaxed perineum or complicating rectocele is essential; (6) a large measure of relief can be expected even in cases in which the condition does not warrant opening the uterus; (7) the uterus not only does not produce any discomfort but many patients have an unexpected feeling of well-being; and (8) advanced age seems no bar to the operation.

Child-bearing after radium and X-ray treatment. Pemberton has shown that a patient can be treated with radium or X-rays and bear normal children subsequently. We have, however, no data on whether or not such treatment decreases the chance of becoming pregnant in women who wish for children, and it would be difficult to get reliable information. Deformed or undeveloped children are not likely to follow such treatment. The chance of miscarriage is greater than in untreated women.

Benign tumours of the placenta. In recording a case of hæmangioma of the placenta Scott states that a case of benign tumour of the placenta was first reported by John Clark in the Philosophical Transactions of the Royal Society of London in 1798, and since that date there has been reported an average of less than one case a year.

Insulin treatment of the toxæmic vomiting of pregnancy. Thalhimer gives details of three cases (in addition to the five already recorded) in which pernicious vomiting of pregnancy has been successfully treated with insulin combined with the intravenous administration of glucose. (See also abstract in the Autumn number of this Journal, page 455.) F. E. T.

American Journal of Obstetrics and Gynæcology.

August, 1924.

*Etiology of certain congenital structural defects. H. J. Bagg.

Natural immunity in the new-born. L. K Musselman.

*Painless childbirth by synergistic methods. (Second paper.) J. T. Gwathmey, R. A. McKenzie and F. J. Hudson.

End results after operations in 53 cases of uterine prolapse. H. Grad.
Further observations of intracranial hæmorrhage in the new-born; significance of yellow spinal fluid and of jaundice in these cases. W. Sharpe and A. S. Maclaire.
*A study of 1,352 placentæ with regard to white infarcts. F. P. McNalley.
*Incontinence of urine due to relaxed vesical sphincter. H. D. Furniss.
Internal migration of the ovum in the guinea pig. P. B. Kinney.
*The contraindications to radium in the treatment of diseases of the female pelvis. F. E. Keene.
Our present attitude towards fibroid tumours. W. Neill.
Purpura hæmorhagic (post-partum) treated with radium and Roentgen ray with report of a case. C. Goldmark and A. W. Jacobs.
*A mixed cell tumour of the uterus. S. Wiener.
Report of two cases of diaphragmatic hernia. J. D. Clark.
Selected Abstracts.—Extra-uterine pregnancy and intra-abdominal hæmorrhages.

Ætiology of certain congenital structural defects. It is known that various agents acting upon the developing embryo at an early stage are liable to result in deformity, while an identical agent acting at a later period of gestation may result in some quite different malformation. Experimentally induced embryonic abnormalities are apparently due to an arrest of development at some critical period of growth. Bagg has conducted a series of experiments in which mice were exposed to X-rays. From these it appears that exposure of a pregnant mouse to radiation may produce malformations which do not appear until the third generation. After this some, but not necessarily the same, malformation becomes hereditary and is reproduced along Mendelian lines. The author produces evidence to show that it is not the structural defect itself which is handed down, but rather a vascular abnormality of of the embryo which results in the arrest of development. If these conclusions are correct the whole question of the effect of radiation upon future generations will have to receive very careful consideration.

Painless childbirth by synergistic methods. The authors have arrived at the following technique in their attempt to relieve the pain of childbirth. When labour is well established a hypodermic injection of morphine (gr. ⅛) in 2.0 cc. of a 50 per cent. solution of magnesium sulphate. Two and a half ounces of ether with an equal amount of olive oil are injected into the rectum soon after. The effect lasts for about four hours, but, if the analgesic effect is insufficient, two additional hypodermics of magnesium sulphate may be required. Pain is eliminated, but contractions continue and the memory of events is either clouded or obliterated. An anæsthetic is generally required as the head passes over the perineum. No ill effects upon mother or child have been noted.

A study of 1,352 placentæ with regard to white infarcts. The conclusions which emerge from this extensive research are that infarcts may be roughly grouped into three classes. The first group is composed of masses of fibrin which have replaced a previous collection of blood. The second group comprise those infarcts which are red to begin with and later become white as described by Young. The third group represents senile changes in the placenta.

Incontinence of urine due to relaxed vesical sphincter. Furniss records good results obtained in this distressing complaint by means of Kelly's operation for plaiting the vesical sphincter.

The contra-indications to radium in the treatment of diseases of the female pelvis. An extensive experience in radium and operative treatment of non-malignant tumours has enabled Keene to formulate certain contra-indications to its use. He does not employ radium in myomata larger than the fist, or in the case of any tumours of rapid growth or which cause pelvic pain. He finds that polypi do not react well, and that marked distortion of the uterine cavity militates against success. Inflammatory foci may be lighted up, and hence these cases and those of severe anæmia, or tumours in young women or of uncertain nature should not be radiated. The author finds that menopausal symptoms are worse after the use of radium than after operation and he, therefore, does not make use of radium in nervous subjects. His final contra-indication is "radiophobia," a disease which appears to be prevalent in America and whose ætiology is to be found in mis-statements, or misuse of radium.

Mixed-cell tumour of the uterus. Wiener records one of these rare mesodermal tumours of the endometrium known as fibrochondromyxosarcoma. The tumour was removed from a women of fifty years of age who was suffering from post-climacteric bleeding. In the first instance a polypoid growth was removed and the cavity of the uterus was then found to be smooth. The patient returned in two months' time with an enlarged uterus which, after hysterectomy, was found to contain a similar growth. This rapid recurrence suggests a high degree of malignancy but the case is reported too near to the operation for it to be possible to form an opinion upon this point.

W. W. KING.

La Gynécologie.

July, 1924.

*On the senile involution of the uterus. P. Petit-Dutaillis.

Testing the permeability of the Fallopian tubes by insufflation. Bloch-Vormser and Roulland.

*The systematic use of Mikulicz drainage in hysterectomy for cancer of the cervix. L. J.-Faure.

August, 1924

Painless hæmatometra and hæmatocolpos unsuspected up to the age of nineteen. J. A. Doléris.

*Trans-sacral anæsthesia in childbirth. Van Erps.

On the senile involution of the uterus. Mention is made of the general atrophy of the organ; ulceration of the mucosa, which causes a discharge, and which if retained leads to pyometra; and bleeding due to arterial atheroma. It is important that cancer should not be overlooked, and a biopsy is necessary on every uterus that bleeds, if the cause of the bleeding is doubtful.

The author then refers to the work of Retterer and Voronoff, who have given a new description of the changes in the endometrium after the menopause. They state that the glandular epithelium proliferates until it fills the lumen, and at the same time the basal membrane becomes indistinct.

It is suggested that, with an imperfect histological technique, it would be easy to mistake these columns of epithelial cells without a limiting membrane, for a carcinoma.

The systematic use of Mikulicz drainage in hysterectomy for cancer of the cervix. Faure points out that, in spite of improvements in sterilization and in repair of the peritoneum, the mortality of this operation remains from 15 to 20 per cent. He has returned to the old Mikulicz technique, with the result that, during the last three years, he has had only three deaths in 76 operations.

In this method a bag is placed in the pelvis and is filled with gauze and swabs packed fairly tightly. The abdominal wound is sutured except for a space at the lower end, through which the mouth of the bag presents. The packs are removed from the third to the fifth day. After that, daily lavage with hydrogen peroxide, both in the bag and by the vagina. The bag is removed about the tenth day, and the suture of the abdominal wall is completed.

Trans-sacral anæsthesia in childbirth. This is stated to give a painless delivery without interference with the voluntary efforts of the patient. The solution is 1 per cent. of scurocaine and the quantity used is 10 cc. It is injected through the two second sacral foraminia, which are situated one inch from the middle line on a line joining the two posterior superior iliac spines. This causes anæsthesia of the area of distribution of all the branches of the sacral plexuses.

A. Gough.

Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.

No. 2, 1924.

*Radium and cancer of the cervix. Results of cases treated in 1919-20-21. M. E. Douay.

Radium and cancer of the cervix. Full details of dose, filtration, etc., are given with considerable amount of clinical data. The general conclusion reached is that unless radium gives much better results than those reported in the paper, wide operation, when practicable, remains the best treatment.

Discussion by J. Gagey, J. L. Faure, Siredey, Paul Guéniot, R. Dupont, Séjournet.

No. 3, 1924.

SOCIETE D'OBSTETRIQUE ET DE GYNECOLOGIE DE PARIS.

*Cæsarean section followed by temporary eventration of the uterus with subsequent return to the pelvis. L. Portes.

*Placental retention: hysterectomy. Vignes.

Cæsarean section followed by temporary eventration of the uterus with subsequent return to the pelvis. A ii-gravida with contracted pelvis; premature rupture of membranes, non-dilatation of membranes, fœtal and maternal stress, fetid liquor amnii. Laparotomy five days after rupture of membranes, 32 hours after onset of labour, eventration of uterus, suture of abdominal wall above uterus in one layer with bronze; uterine incision and emptying; interrupted deep silk with interrupted superficial catgut sutures;

oil dressing. The uterus was kept outside the abdominal wall to allow of its removal without reopening the abdomen in case evidence of infection rendered hysterectomy advisable later. A few superficial sloughs where catgut had been too tight; deeper suppuration about silk sutures which came away with a certain amount of the superficial part of the scar; lactic broth dressing; secondary suture of uterine incision. Thirty-four days after operation slight enlargement of the lower angle of the abdominal incision and freeing of the adhesions about the pedicle allowed the uterus to slip back easily into the pelvis. Single layer stitching with bronze of the abdominal wound and drainage of the pouch of Douglas. Discharged after a further fortnight in hospital. The uterine involution and the lochia were not affected; the slight œdema of the appendages noted was probably due to mild circulatory obstruction.

Placental retention: hysterectomy. Placenta prævia at six months; placenta adherent partially and very firmly to the uterus (accreta); in view of the bad general condition and the firmness of the placental adhesions, active measures were postponed; temporary improvement, but sepsis intervened on fourth day whereon vaginal hysterectomy was undertaken with happy result.

SOCIETE D'OBSTETRIQUE ET DE GYNECOLOGIE DE PARIS.

*Uterine antisepsis in puerperal infection by means of a filtrate of a culture of streptococci in Broth. Couvelaire, Levy-Solal and Simard.

Uterine antisepsis in puerperal infection by means of a filtrate of a culture of streptococci in Broth. No details of Broth, length of time of culture, or whether the streptococci cultures were autogenous, are given. A reference to a publication before the Société de Biologie, Feb. 23, 1924, is made. Four cases are quoted, two mild, and two severe; in the two severe cases streptococci were found in the lochia but not in the blood.

SOCIETE D'OBSTETRIQUE ET DE GYNECOLOGIE DE BORDEAUX.

*Rupture of the uterus with central placenta prævia. Eparviér and Charleux.

*Double opodyme monster (diprosopus). Voron, Rhenter and Calvel.

Rupture of the uterus with central placenta prævia. Appparently a spontaneous rupture through the lower posterior wall needing manual interference. Autopsy was refused.

Double opodyme monster (diprosopus). Full description with photograph; Janus monster, anencephalus and diaphragmatic hernia.

REUNION OBSTETRICALE ET GYNECOLOGIQUE DE MONTPELIER.

*Investigations on the frequency of prolapse of the cord. Vallois & Roumé.

*Cæsarean section with enucleation of the ovum. Paul Delmas and Roumé.

Investigations on the frequency of prolapse of the cord. The writers do not distinguish between prolapse and presentation (the term they use is " procidentia "). They report a frequency of one in forty-four in nearly seven thousand deliveries and quote their predecessors in the same clinic 1 in 14, Stolz 1 in 53, Tarnier 1 in 86, Ribemont 1 in 230, and Lachapelle 1 in 380. They find the fœtal mortality high—about 37 per cent.—and partly due to the ætiological factors.

Cæsarean section with enucleation of the ovum. Attachment of placenta on the anterior wall led the operator to strip the intact bag of membranes and placenta off the uterus rather than to incise or displace the placenta in the usual way; the fœtus was observed to pass meconium before its release.

R. A. HENDRY.

Annali di Ostetricia e Ginecologia.

January, 1924.

The Royal University of Milan. S. Patellani.

*On the sedimentation rate of the red blood corpuscles in obstetrics and gynæcology. G. S. Flores.

*On fibromas of the ovary. Anatomico-clinical contribution. M. Massazza.

February, 1924.

*Clinical contribution to the study of infantile vulvo-vaginitis. C. Tenconi.

Pessary with external beak for genital prolapses. E. F. Fabbri.

*An interesting case of double uterus and vagina complicated with unilateral hæmatosalpinx and hæmatocolpos.

On the sedimentation rate of the red blood corpuscles in obstetrics and gynæcology. Fahraeus in 1918 called attention to this phenomenon and noted the different celerity of sedimentation of red blood cells in non-gravid woman, in gestation, and in the puerperium, and the constant augmentation of the velocity in the gravid state. He considered that he had found an easy means of diagnosis of pregnancy. Further researches have proved that an increase of velocity of sedimentation of red blood cells occurs also in syphilis, tuberculosis, acute infectious diseases, acute inflammatory processes of the female generative organs, malignant neoplasms, malaria, and in some cases of mental disease.

Flores used the method of Linzenmeyer. He obtained the following results :—In healthy non-pregnant women sedimentation (column of plasma reaching the 18 mm. mark) was completed in 3-4 hours. In gravid women at term and during the eighth month : eighth month sedimentation in 34 to 65 minutes, at term 30 to 60 minutes. In the puerperium from childbirth to termination : in the first 3-4 days, 25—30 minutes; from twelfth day the velocity gradually lessens until it becomes normal. After abortion from second to fourth month : one hour and twenty minutes to two hours. In acute inflammatory processes : rate of sedimentation much greater than in pregnancy or the puerperium, 10 to 30 minutes. In chronic inflammatory processes, 2 to 3 hours. In hypermenorrhœa : 40 to 50 minutes. In benign tumours : 1½ to 2 hours. According to various authors, the rate is increased (Gaifami in cancer of uterus after half an hour, 1 hour, 6 hours, found values respectively of 12, 30, 46 mm.), so that the phenomenon may be of practical use in diagnosis of doubtful cases. In cases of vesical mole : 40 to 45 minutes. In some cases of tubal pregnancy with pelvic hæmatoma : 2½ hours.

Conclusions : The acceleration of sedimentation in hypermenorrhœa and in cases of vesicular mole is worthy of note.

The practical importance of the method in the case of normal pregnancy is much limited : it cannot serve as an aid to diagnosis of early pregnancy because sedimentation then occurs slowly.

If sedimentation occurs quickly in the first 3-4 months of pregnancy the existence of vesicular mole would be indicated.

On fibromas of the ovary. Anatomico-clinical contribution Fibrous tumours of the ovary are commonly classified in accordance with their form in two principal varieties : one " circumscribed " or " polar," which appear to be developed from a circumscribed portion of the ovary, a greater or less part of the ovary remaining unaffected and retaining its normal characteristics; the other, in which there is no longer visible any remnant of the ovary, the tumour having assumed a characteristic and regular form of a large kidney having a sort of hilum in the median portion of one of the two margins through which penetrates the vascular pedicle of the tumour.

The circumscribed fibromas do not ordinarily attain a conspicuous size.

Diffuse fibromas may reach a large size, although they do not usually exceed the size of an adult head.

True perunculated fibromas of the ovary have been recorded (papillary fibromas of Pfannenstiel) but are extremely rare as are the tumours of irregularly globose form, which may have originated in circumscribed fibromas associated with complete atrophy of the ovary.

Ovarian fibromas are superficially white, uniformly shining, a wooden consistence altogether special and not like the " hard " fibromas of the uterus.

The surface of a section is white, sometimes shining, very like the section of a tendon, showing a very dense fabric of bundles which run in various directions sometimes straight more often undulating, giving to the surface in typical cases a plexiform aspect (" fibroma plexiforme ").

The diffuse fibromas present commonly a covering of cubical epithelial cells, sometimes slightly flattened. On the periphery is seen a condensation of fibrils running longitudinally and forming a fibrous capsule devoid of cellular elements and containing very few vessels. The neoplastic tissue is formed of connective tissue fibrils, cellular elements, and vessels. Among the fibrils are numerous nuclei, elongated, fusiform, which belong to cells intimately connected with and lying amongst the connective tissue fibrils.

In different parts of the tumour can be demonstrated large zones formed of fibroblasts in which some characters of the nucleus or of the protoplasm indicate different modes of evolution, and isolated elements like undifferentiated elements of reticulo-endothelial derivation.

Looking to the richly cellular element which is sometimes present, which is not observable in fibromas of other organs or tissues, the doubt may arise of these being large-celled sarcomas, or fibromas, undergoing sarcomatous transformation.

The tumours were found mostly after middle age. In eight cases the age was over 50, in four 40, in two between 20 and 40. Ovarian fibroma cannot be termed an affection of advanced life on account of the very slow development of this type of tumour, and the very slight symptoms which habitually accompany it. Compression of vessels, nerves or ureters was not observed. Unlike fibromas of the uterus ovarian fibromas have no influence in sexual activity; they produce neither menorrhagia nor amenorrhœa. In half the cases ascites was found.

Diagnosis from a pedunculated uterine fibroid is of little practical importance as the same line of treatment is necessary in both. Diagnosis from a wandering spleen can be made by palpation, percussion, and radioscopy of the hypochondrium.

Two forms of retrogression may be found in ovarian fibroids : œdematous

degeneration and calcareous degeneration. Diffuse necrobiosis precedes the process of calcification.

Surgery alone can cure solid benign tumours of the ovary. The operation is usually simple. On the other hand, extensive and tenacious adhesions of the tumour to the posterior wall of the uterus and to Douglas' pouch may render necessary total hystero-annexiotomy, as in a case reported by Cabanes.

Clinical contribution to the study of infantile vulvo-vaginitis. In the obstetrico-gynæcological clinic in Milan during the last three years, 303 cases of vulvo-vaginitis were treated in children from one to thirteen years of age. The clinical examination was always methodically completed by the microscopical examination of the secretion, with the view of identifying the causal pathogenic germs. Staining was by Gram.

The findings were: Of 303 cases, in 84 the gonococcus was found, or germs similar to gonococcus, decolourized by Gram. In 164 cases were found various species of Gram-resisting cocci, chiefly staphylococci. In 49 cases bacilli not further identified were present. The percentages were as follows:—Gonococci, 27.7 per cent.; Gram-negative cocci, 56.0 per cent.; Bacilli, 16.0 per cent.

Frequently in chronic cases, where a first examination is negative, another examination made some days later will give a positive result; this is sometimes only obtained after vaginal instillation of solution of nitrate of silver which provokes a transitory increase of the purulent secretion.

Vulvo-vaginitis in children often does not excite the attention of the child or its parents. It is difficult in gonorrhœal cases to trace the origin and mode of infection. In none of the cases were traumatic lesions observed which might lead one to suspect attempts at coitus. More probable were infections contracted at school (contact with closets, infected benches, etc.), or at home from linen or other objects. Most of the patients were children of poor people, who live in crowded spaces, with the greatest promiscuity of every kind, and where it is not rare for two or more persons to sleep in the same bed. In not a few instances the mother, the sisters or the brothers were affected with gonorrhœa. In some cases the child is infected from the maternal genitals during parturition.

Gonococcal vulvo-vaginitis in children is little amenable to the usual therapeutic measures. It tends to become chronic, and the infection may persist to puberty when at the first menstruation the infection ascends to the endometrium and the tubes.

Having experimented with different preparations, we have fallen back on solutions of nitrate of silver in 1 per cent. Stronger solutions are used in the very acute cases. Success depends essentially on the technique employed. We use a common glass syringe, holding 20 cc., for injections. The duration of the treatment is not possible to calculate, nor the number of medications necessary. For the most part 15 injections are sufficient to produce negative microscopic results and to cure the inflammatory phenomena. In non-gonococcal vulvo-vaginitis two or three medications are usually sufficient for a complete cure.

An interesting case of double uterus and vagina complicated with unilateral hæmatosalpinx and hæmatocolpos. The author adopts the classification of Ombrédanne and Martin, who describe three types of double uterus:—

1. Double uterus with independent cervices.

2. Double uterus with cervices close together.
3. Double uterus with fused cervices.

He notes, however, that this classification omits anomalies of the vagina, which are surgically of great interest; when one or both of the double vaginas are impervious we get hæmatocolpos, accompanied or not by complications of uterus, tubes, and ovaries.

Clinical history. V. E., aged 17 years. Father and mother living and healthy. One brother and a sister both in perfect health. In early infancy she had measles. First menstruation at 15, scanty, lasting five days, accompanied with very sharp colicky pains, exhaustion, and a sense of tension in lower abdomen. These pains, exacerbated at every menstrual period, were continuous when the patient was standing up, were lessened when lying in her bed and with local application of ice. She noted, in the hypogastrium, a swelling which gradually increased in volume, accompanied with obstinate costiveness and difficulty in micturition. In October, 1922, she consulted a doctor, who diagnosed a malignant tumour and advised an intensive cure with X-rays. This was carried out without any relief.

She came under the author's observation on 4th December, 1922. On inspection, there was a swelling in the lower part of the abdomen, more evident in middle line. On palpation this swelling was found to present three bosses, one median large, and two lateral smaller: the right one, as large as two adult fists, and the left the size of a mandarin orange, rising slightly above the level of the pubes; both lateral swellings were painful, free from anterior abdominal wall, with smooth and almost regular surface, fluctuating, dull on percussion. The median swelling rose about four fingers above the pubes, in its upper part its consistence was hard and the surface irregular, in the lower part it was elastic and fluctuating and its surface smooth; on the right it was in contact with the corresponding lateral boss, from which it seemed to be everywhere separated by a small cleft; on the left it was clearly separated by a deep sulcus from the other swelling. The external genitals were normal. Hymen entire.

Operation on 7th December, 1922, under morphine-chloroform. Trendelenburg position. Laparotomy revealed: (*a*) a large blood cyst of the right tube, with hæmorrhages in corresponding ovary; (*b*) left ovary was cystic and the tube twisted and with hæmorrhagic infarct; (*c*) ovaries and tubes surrounded by intestinal loops and loosely adherent to omentum; (*d*) a double uterus slightly displaced to the left, and beneath it, on the right, and incorporated with it, a fluctuating tumour recognized as that median swelling found on vaginal and rectal exploration.

An exploratory puncture of this fluctuating tumour gave exit to hæmorrhagic contents, and further examination showed the impervious vagina on the right side. On the left side there was a normal vagina for the left uterus. Both uterine bodies, the ovaries, tubes and the greater part of the impervious vagina were removed. The patient left hospital quite cured after thirty days.

An excellent diagram of the condition is included in this paper.

J. R. Forrest.

Acta Gynecologica Scandinavica.

Vol. iii, Fasc. 2, 1924.

*The results of the expectant treatment of 1,141 cases of febrile incomplete abortion at the South Stockholm Lying-in Hospital. Emil Bovin.

*Experience and results of the radiological treatment of ovarian carcinoma. J. Heyman.

A case of ischiopagus. J. W. S. Johnsson.

*Iso-agglutination in new-born infants and their mothers. Y. Zotterman and E. Wildner.

*On the histology of gonorrhœal salpingitis, with special reference to the presence of plasma cells. A. Sjöberg.

A case of capillary angeioma of the placenta. A. Berglund.

The results of the expectant treatment of 1,141 cases of febrile incomplete abortion at the South Stockholm Lying-in Hospital. This has been the routine treatment since October, 1911. The number of deaths has been 24, or 2.1 per cent. In 623 cases spontaneous delivery occurred, giving a mortality of 1.3 per cent. The uterus had to be emptied on account of dangerous bleeding in 206 : mortality 2.4 per cent. In the remaining 312 the uterus was emptied on account of the protracted course of the case : mortality 3.2 per cent. Their experience has shown that it is desirable to wait until the temperature has been normal at least six days before evacuating the uterus. Since quinine has been given (3 grains five times a day for one, two, or at the most three days) the proportion of spontaneous deliveries has been greater.

Only 5 per cent. of the patients needed to be kept in hospital longer than a fortnight. If the expectant treatment leads to any loss of time this is justified by the saving of life.

The writer has no doubt that most seriously infected abortions are of criminal origin, and these have been much more numerous during the past few years in Sweden on account of the difficult economic conditions.

Experience and results of the radiological treatment of ovarian carcinoma. During the years 1911—1922, 68 patients were treated at the Stockholm Radium Institute. Survivals at the end of two years were 39 per cent.; at the end of five years from the beginning of the treatment, 27 per cent. Technical details are given. It has been found that X-rays alone are inferior to radium, and this is most effective when placed inside the uterus. The latest conceptions of the treatment of ovarian carcinoma are summarized thus :—

1. Operable cases must undergo the radical operation. In apparently hopeless cases an exploratory laparotomy should be undertaken and as much of the tumour removed as possible. The uterus should be preserved.

2. After operation radiological treatment should be begun at the earliest moment.

3. The radiation should be performed with radium (best intra-uterine), combined with X-rays administered through three or four ports of entry.

4. Radiation should also be carried out in cases in which even a partial operation is impossible.

Iso-agglutination in new-born infants and their mothers. Zotterman and Wildner have failed to confirm the results of McQuarrie (*Bull. Johns Hopkins Hosp.*, 34, 51, 1923), who found inter-agglutination in 70 per cent. of cases of toxæmia, and on that finding based an hypothesis that the toxæmia is a result of the different blood-grouping of fœtus and mother. In the present investigation of 208 cases, including 45 toxæmias, the proportion of inter-agglutinations was about the same in the non-toxæmic and toxæmic—

14.7 per cent. and 13.3 per cent. respectively. In no case did the child's serum agglutinate the red corpuscles of its mother.

On the histology of gonorrhœal salpingitis, with special reference to the presence of plasma-cells, Schridde, Zweifel and others have claimed that a gonorrhœal salpingitis can be recognized by the histological characters, and especially by the presence of large numbers of plasma cells in the wall of the tube and in the purulent exudate. Sjöberg found a plasma-cell infiltration in 37 out of 49 cases with a history of gonorrhœa. But he also found a similar condition in 81 out of 119 cases of chronic salpingitis without gonorrhœa in the anamnesis. As regards adhesions between the plicæ and the presence of free exudate, there was no appreciable difference in the two classes. He concludes that in chronic salpingitis the plasma-cell infiltration has no value in differential diagnosis, since it appears at a certain stage of chronicity independently of the etiology. A. GOUGH.

Archiv für Gynäkologie.

Vol. 122, Parts 1 and 2, *July* 1, 1924.

The choice of anæsthetic in gynæcological operations. F. Peyser.
Rectal examination in labour. R. Demme.
An early human ovum. P. Meyer.
Physiology and pathology of the round ligaments. M. G. Serdjukoff.
The region of the clitoris. N. Temesváry.
*Structure of the ovarian artery in cases of ovarian tumour. S. di Francesco.
A case of true peritoneal pregnancy. W. Poten.
*Venous pressure during pregnancy, labour and the puerperium. H. Runge.
Do climatic conditions affect the incidence of eclampsia? W. Oppenheimer.
Metastatic puerperal disease, especially after influenza. A. Mayer.
The gynæcological and obstetrical significance of duplicity of the female genital organs. R. Zimmerman.
The behaviour of the normal and diseased heart during pregnancy and labour. S. Prassulides.
The part played by exogenous factors in human intra-uterine development with special reference to war and post-war conditions. S. Peller and F. Bass.
Alterations in blood morphology in connexion with bacteriological findings in morbid conditions of the puerperium. E. Phillipp and E. M. Fuss.
Pregnancy and suppuration in the adnexa. R. Kräuter.
*Protein therapy of inflammatory adnexal tumours. H. Nevermann.
*Relations of germinal glands in the female to renal diabetes. H. Küstner.
*Radiation treatment of menstrual anomalies occurring in youth, with reference to the correlations of internal secretions. F. Gál, S. Rusznyák and N. Dach.
The value of the Sachs-Georgi reaction during pregnancy. G. Tsakyroglu.
The Wassermann reaction during labour and its significance in the detection of syphilis in the mother and the new-born. E. Finkener and L. Neugarten.
The cystic corpus luteum and cystic follicle formation. H. Iseki.
Regressive metamorphosis in adenomyoma. W. Schiler.
Peritoneal polycystic lymphangioma. E. Puppel and G. B. Gruber.

The ætiology of hyperplasia of the endometrium. A. A. Babes.
The condition of the soft parts in primiparæ. E. von Graff.
Multiple cavernous hæmangioma in the new-born. H. Runge.

Structure of the ovarian artery in cases of ovarian tumour. Seventeen cases have been examined: in all cases of ovarian tumour (in the clinical sense) there are striking alterations in the media, with proliferation of connective tissue and appearance between the muscle fibres of plump elastic masses: these changes are most marked in cases of dermoids, retention cysts and "tubovarian" cysts. In all cases, even in patients aged less than 30, the intima is thickened and shows splitting of the internal elastic lamina.

Venous pressure during pregnancy, labour and the puerperium. The venous pressure was directly measured in 48 patients by connecting the interior of a cutaneous vein with a water manometer. In the absence of pregnancy the pressure in the veins of the leg is about the same as in those of the arm. During pregnancy, even in the early months, the pressure in the leg veins is considerably higher (frequently as much as 50 mm. of water or more) than in the arm veins. During the puerperium the venous pressure in the lower extremities is very greatly reduced and frequently becomes less than in the upper limbs—a finding that is possibly of importance in connexion with the ætiology of puerperal thrombosis.

Protein therapy of inflammatory adnexal tumours. From an analysis of the duration of treatment and the ultimate results, subjectively and objectively considered, in (1) 200 cases of inflammatory adnexal tumours treated by injections of foreign proteins; (2) 400 cases treated by other means (rest, hot douches, light and heat baths) Nevermann concludes that protein therapy is no more effective than the other measures, and might therefore be dispensed with. Its value lies in that (1) it is more easily applicable in general practice than is the case with physical methods of therapeutics, (2) it has a useful psychical effect.

Relation of germinal glands in the female to renal diabetes. Several experimental contributions are made to the question of renal glycosuria in pregnancy, which is described as occurring both in animals and the human species. In the latter the renal permeability to sugar diminishes towards term and only 20 per cent. of subjects give positive tests at the time of delivery. Renal glycosuria is found in non-pregnant women a few days before menstruation and in animals at the time of rut. After interruption of pregnancy renal glycosuria disappears within two to four days: hence the test is of little aid in the diagnosis of ectopic gestation. Renal glycosuria is no longer to be detected in gravid animals after extirpation of the ovaries but is unaffected by hysterectomy; similarly implantation of ovaries from gravid into non-gravid animals leads to renal glycosuria of a few days' duration. The conclusion is drawn that the glycosuria depends on the presence and internal secretory activity of a corpus luteum. The blood-sugar was estimated in all the observations: the renal glycosuria was provoked by adrenalin injections.

Radiation treatment of menstrual anomalies occurring in youth. Promising results appear to have followed treatment of excessive bleeding in young subjects (in whom no organic pelvic disease was detected) by X-radiation in minimal doses of the thyroid gland. The respiratory exchange was as a

rule diminished before and increased after treatment. Very small doses of radiation stimulate thyroid function, with repercussion on the ovaries: larger doses, as is well known, diminish it. W. E. CROWTHER.

Zeitschrift für Geburtschülfe und Gynäkologie.

Band 87, Heft 1, *February*, 1924.

*On X-ray stimulation of the ovaries. J. Wieloch.

*The communication of movements of the body to movable structures inside the body. H. Sellheim.

*Müller's method of direct delivery of the shoulders in breech presentations. C. Abernetty.

*On congenital anomalies of the Fallopian tubes. L. Schoenholz.

*On uterine perforations and their treatment. A. Heyn.

*A case of atypical spontaneous rupture of the uterus. K. Heim.

*An experimental study of the movements of the uterus in animals—the effect of certain pharmacological preparations. F. Ludwig and E. Lenz.

On X-ray stimulation of the ovaries. The author makes an interesting contribution regarding a new field for X-ray therapy. He deals with a group of cases suffering from amenorrhœa, oligomenorrhœa, hypomenorrhœa and sterility, in which, by elimination, the cause could be ascribed to deficient ovarian function. He uses X-rays in small doses to stimulate the growth of the follicle and corpus luteum cells in the ovaries; he uses from one-fifth to one-third of the castration dose and repeats the treatment at six to eight weekly intervals. His successes have been few, only seven in a series of thirty cases, while on the other hand five have had their lesion exaggerated by the treatment. In cases of amenorrhœa he had no successes: in seven cases where the periods were infrequent he had one success and one temporary improvement: where there were only scanty periods he had five successes in 11 cases, while four others showed temporary improvement. In two cases of premature menopause he was quite unsuccessful: in one case where the complaint was sterility the patient became pregnant after three applications of X-rays.

A survey of all his cases shows that success is most likely to occur where the deviation from the normal is least, an experience which is not confined to the X-ray treatment of such lesions.

The communication of movements of the body to movable structures inside the body. Professor Sellheim collects the views which he has recently been expounding regarding the causes of torsion of the pedicle in tumours and of certain intra-uterine movements of the fœtus. He proceeds, from a few very simple experiments in the mechanics of rotation, to build up with his usual ingenuity the physical principles controlling movable intra-abdominal structures. Solid tumours, such as fibroids, very seldom undergo torsion, because not only is the pedicle usually broad, but also the inertia of the solid tumour soon brings it to rest when the body stops moving. A cystic tumour, on the other hand, is more likely to be associated with a twisted pedicle, because the momentum of the swirling fluid resulting from rotatory movements of the patient herself, may carry the cyst round on its pedicle after the body has come to rest. The fœtus similarly, at certain stages of its development, may be swung round like any other suspended body, except in so far as it is impeded by resting against the uterine wall. When

the rate of movement, that is of rotation, becomes sufficiently great the fœtus will swing up from its resting place on the uterine wall and take on the same type of movement as the surrounding parts: not only so, but when the main body has come to rest, the amniotic fluid will continue moving and so carry the fœtus with it. From such phenomena Professor Sellheim derives torsion of the cord and even knots in the cord. To promote disturbances of the types described, the author seems to depend on much more prolonged and violent rotatory movements in human beings than usually occur in ordinary life.

Muller's method of direct delivery of the shoulders in breech presentations. The author describes his experience of the method of direct extraction of the shoulders by forcible traction on the trunk of the fœtus as described by Müller 25 years ago. He gives an exhaustive resumé of the history of this particular niche in midwifery and concludes that Müller's method is a great advance on a similar manœuvre described by Deventer 150 years ago. He considers that Müller's method is contra-indicated in cases of (1) contracted pelvis; (2) large children; (3) resistant soft parts; (4) nuchal displacements of the arm, and (5) lack of experience on the part of the operator. The gravest objection to the method is the risk of injury to the fœtal vertebral column. Veit and Ziegler have both published cases in which fracture of the vertebræ occurred. The author reviews a series of 216 cases, of which 164 were primary breech presentations, while 52 had been converted to breech cases by version. In 83 per cent. of the first group he had complete success, and managed to release one arm only in another 6.7 per cent.; the remainder were complete failures. It is worth while noting that in the converted cases he was less successful: only 53.8 per cent. were completely successful, and 7.7 per cent. allowed the release of one arm. In 51.7 per cent. of all cases the child was delivered in good condition: in 30.5 per cent. asphyxia was present: 12.5 per cent. were stillborn: the remainder suffered from paralysis, separation of epiphyses or fracture of long bones. The author discusses other methods for the treatment of this condition: he seems to prefer the Rosshirt method of direct traction on the more accessible shoulder with the curved index and middle fingers of one hand, to the more usual method of the high release of each arm in turn by means of the fingers above the pelvic brim. The latter method gives less access, but he admits that the former method may still lead to fractures of the clavicle or other damage, except the traction is exerted just over the acromion.

On congenital anomalies of the Fallopian tubes. The author describes the intimate structure of a series of specimens obtained from lesions of the Fallopian tubes. Those lesions are of the type which used to be ascribed to inflammatory processes, *e.g.*, salpingitis isthmica nodosa and the occurrence of diverticula of the tube. The present study shows that the actual basal lesion seems to be either an inclusion of some very active epithelium within the tubal mucous membrane, a deep penetration of the tubal epithelium into the wall of the tube, or a disturbance in the relationship of the muscle and connective tissue of the wall to the other portions of the tube. In none of his six specimens do the histological appearances show any evidence of inflammatory processes. He extends this series by a seventh specimen obtained from a new-born child in which he found already a lesion of a similar type. The author seems quite justified in his view that lesions of this type are really of congenital origin.

On uterine perforations and their treatment. The author describes a series of cases of perforation of the uterine wall. In the non-gravid uterus he does not consider that operative treatment is necessary in most cases, as spontaneous healing so often occurs. The important cases are those in which the gravid uterus has been perforated. Of these the worst are the cases following criminal abortion, because there a widespread peritoneal infection has usually occurred before the patient comes for treatment. The important factors in the other cases are the type of instrument which causes the perforation and the actual seat of the perforation. While most writers find that the perforation has been caused most often by either the curette or some form of forceps, the author found that in 11 out of his 32 cases the perforation was caused by a Hegar's dilator, and in others he thought that the curette had been passed through an opening already made by the dilator. He found that a considerable number of the perforations began in the cervix and might either pass along the uterine wall to puncture the serous coat eventually, or pass directly into the broad ligament from which they might also reach the abdominal cavity. He treated 19 of his cases by complete hysterectomy, with two deaths, and eight by careful suture of the perforation with one death. The suture technique must be most careful. Not only should the muscle tissue be sutured, but the peritoneum should be carefully united over the opening and further drawn across by an infolding suture. He does not think it necessary to attempt to leave the perforation area external to the general peritoneal cavity, as is suggested by some surgeons.

A case of atypical spontaneous rupture of the uterus. This was a case of a primigravida in whom there was a brief onset of labour pains a fortnight before birth actually occurred. After the child was born the patient very quickly collapsed and showed signs of a severe intra-peritoneal hæmorrhage. An hour and a half later the abdomen was opened and a large amount of blood was found in the pouch of Douglas. Investigation showed a longitudinal tear about 11 cm. long, a little to the left of the middle line, and reaching to the lowest point of the pouch of Douglas. This tear passed right into the uterine cavity. The wound was stitched and the patient made a good recovery. The cause of this tear was rather difficult to find; the pelvis was just a little smaller than normal, and the baby was not of a size likely to cause any difficulty. The author believes that this tear may have occurred at the premature onset of labour a fortnight before, but that the position of the fœtal head prevented bleeding until the third stage of labour.

An experimental study of the movements of the uterus in animals—the effect of certain pharmacological preparations. This is the supplement to a communication by the same authors in the preceding issue of the *Zeitschrift* (see *Journ. of Obstet. and Gynæcol. of Brit. Emp.*, 1924, xxxi, 472). The first drug tested was adrenalin. In the non-gravid and in the puerperal uterus of the rabbit the injection of this drug was followed by a condition of complete rigidity of the uterus which lasted for five or six minutes. The condition was one of tonic contraction with very marked anæmia of the whole organ. The end of this phase was marked by great hyperæmia. In the uterus of the pregnant rabbit adrenalin caused very sharp peristaltic movements and the occurrence of very marked individual ring contractions,

with a less degree of anæmia than in the non-pregnant uterus. Pituitrin showed a varying action on the uterus throughout three different phases. In the first phase, which lasted about ten minutes, there was a lasting tonic contraction of the whole uterus. The second phase was characterized by rapidly alternating periods of tetanic contraction and complete relaxation. It was only in the third phase that definite peristaltic movements could be identified. Anæmia was present in the first phase, while in the second phase the uterus became very markedly hyperæmic. Placental extract proved a very powerful stimulant of peristalsis, so that the uterus appeared to be in a condition of continual movement. Drugs of the ergot type also produced a state of tonic contraction passing into vigorous peristalsis. The special action of this drug was that the muscle tone of the uterus seemed to be very much increased. Atropine caused a complete relaxation of the uterus with diminution of peristalsis lasting over a long period.

JAMES HENDRY.

Monatsschrift für Gebürtshülfe und Gynäkologie.

Vol. lxvii, Nos. 1-2, *August*, 1924.

A case of intracystic papilloma of the left labium majus. G. Arns.

*Menge's formalin treatment of chronic endometritis. A. Bauereisen.

*Further results in the treatment of carcinoma of the female genital tract by X-rays and radium. R. Bretschneider.

*A cured case of chorionepithelioma in the broad ligament. E. Engelhorn.

*The treatment of urethral incontinence, with special reference to the plastic surgery of the pyramidalis fascia. H. Eymer.

*A study of the carbohydrate metabolism of the normal human placenta. K. Felix and K. v. Oettingen.

*The value of Menge's intrauterine painting with formalin in the treatment of sterility in women. C. Glaevecke.

*Isolation of trophoblast cells and their influence on the surviving uterus. L. Handorn.

*Clinical experience of Rivanol. K. Kayer.

*A case of puerperal thrombosis of the portal vein. Linzenmeier.

*A criticism of the methods of diagnosis of early pregnancy. M. Neu.

*Uterine hæmorrhages caused by disturbed regeneration of the endometrium. O. Pankow.

*Statistical research on the problem of eclampsia. F. Sachweh.

*Operative treatment of the more advanced cases of extrauterine pregnancy. F. Schatz.

*Investigations on the leucocytosis of pregnancy. F. Schultze-Rhonhof.

*Myasthenia gravis and the female genital system. A. Wolff.

*Inflammatory tumours of the adnexa and early carcinoma. P. Wolff.

Vol. lxvii, No. 3-4, *September* 1924.

*The function of the autonomic nervous system in pregnancy and its disturbances. L. Seitz.

A case of full-term ruptured interstitial pregnancy, simulating a utero-abdominal pregnancy. A. Heyn.

*Spontaneous rupture of the cord during labour. W. Walz.

*The treatment of acute inflammation of the adnexa by intravenous injection of calcium. A. von Fekete.

*Inflammatory diseases of the adnexa. O. Plümecke.

*A suppurating parovian cyst, and a dermoid of the same appendage. B. Liegner.

*A new method of determining the sedimentation rate in serum, together with some investigations on the sedimentation time during labour. E. Klaften, L. Bodnar and W. König.

*The effect of X-rays on the retrogression of myomata. Y. Yamasaki.

*On the prophylaxis of ophthalmia neonatorum. Israel.

Menge's formalin treatment of chronic endometritis. Menge's treatment of the interior of the uterus with formalin still has its place in minor gynæcology, where its success depends on careful technique and the selection of suitable cases. Both these conditions necessitate a certain amount of special experience and the treatment should therefore be left to the gynæcologist.

Further results on the treatment of carcinoma of the female tract by X-rays and radium. The results of operative treatment of genital carcinomata can be improved by X-ray and radium treatment in that (*a*) cases are dealt with where the general health contraindicates operation; (*b*) prophylactic doses reduce the number of recurrences; and (*c*) inoperable cases can be improved or cured. It is unwise to use the treatment as a routine without regard to operability, as the sensibility of individual growths to radium varies greatly and cannot be determined histologically.

A cured case of chorionepithelioma in the broad ligament. The patient had toxæmic vomiting from the second month of pregnancy, which was so severe that the uterus was curetted without any relief of symptoms. Three weeks later a laparotomy was performed, and the right ovary and tube were removed with a mass of blood clot; the patient made an uninterrupted recovery. Further microscopic examination, however, showed vesicular elements and malignant invasion of the broad ligament and ovary by syncytial cells and villous processes. The case was therefore presumably one of primary intrauterine vesicular mole with early metastases in the broad ligament.

The treatment of urethral incontinence. The numerous cases of incontinence of urine due to trauma during childbirth with or without a cystocele are generally cured by a direct muscle plastic operation. Occasionally a plastic operation may have to be added in which the vaginal fornices are slung up to the pyramidalis fascia. No surgical treatment avails in the psychic and spinal cases, but the second operation mentioned above has been successful in cases due to local lesions of the vesical nerves.

A study of the carbohydrate metabolism of the normal human placenta. The fresh placenta was transfused through its vessels with various solutions, and the amount dissolved in the latter before and after transfusion was estimated. It was found that glucose was reduced from 67 to 82 per cent., potassium iodide slightly less, while insulin and glucose gave an increase, and insulin only had no effect on the glucose content of the final solution. The glucose absorbed may be broken down, or changed to glycogen, or retained as such. Estimation of the glycogen present was also made before and after sugar transfusion, but with inconclusive results, no definite loss being found.

The value of Menge's intrauterine painting with formalin in the treatment of steriltiy in women. Glaevecke strongly recommends Menge's formalin treatment for cases of sterility especially those due to endometritis; and believes it can be carried out easily and practically painlessly in the consulting room.

The isolation of trophoblast cells and their influence on the surviving uterus. Handorn's investigations were undertaken to test the truth of de Snoo's theory that the degeneration of the trophoblast cells at the end of pregnancy and the consequent removal of their inhibiting action on the uterus was the cause of the onset of labour. He found a method of isolating the trophoblast cells by immersion for 24 hours in 1 per cent. acetic acid, and his final extract had no inhibiting effect on the uterus, but rather caused a rise of its tone. The trophoblasts therefore have nothing to do with the onset of labour.

Clinical experience of Rivanol. Kayser has been very successful in treating closed abscesses by aspiration and injection of rivanol, and the method gives better cosmetic results with less pain than incision and drainage. The preparation is less useful in dealing with open infected wounds.

A case of puerperal thrombosis of the portal vein. The symptoms of this condition are largely intestinal, due to hæmorrhagic infarction of the bowel, gangrene, exudation into the peritoneum, infection of the fluid and finally general peritonitis. There is severe abdominal pain, and generally local tenderness and tumour formation. The stools are generally first fæcal, then offensive and bloody and later absent. An important symptom present in the reported case was an increasing anæmia, which was so marked as to give rise to a temporary diagnosis of pernicious anæmia.

A criticism of the methods of diagnosis of early pregnancy. Not even the more modern simpler methods have rendered the Abderhalden reaction certain or practically available, while the phloridzin test which is technically easier, is very variable in its results. The early diagnosis of pregnancy still rests on a careful consideration of the history and the objective signs.

Uterine hæmorrhages caused by disturbed regeneration of the endometrium. Pankow describes a small group of cases in which slight uterine hæmorrhage persists after a period or delivery and clears up after the next period. He found very scanty curettings in these cases, and assumes that they are due to defective regeneration of the endometrium.

Statistical research on the problem of eclampsia. Sachweh investigated the incidence of eclampsia during the years of the war and the different months of the year, and found it decreased greatly during the later war years, when the population subsisted largely on carbohydrates. He also believes that metereological conditions had some effect, as the wetter months showed more cases, possibly because of interference with the excretion of sweat.

Operative treatment of the more advanced cases of extrauterine pregnancy. After emphasizing the impossibility of laying down any hard and fast rules in these cases, Schatz gives a few guiding lines for several types of cases. The crux of the treatment lies in the possibility of controlling hæmorrhage; and where this is impossible, as with an extra-genitally placed placenta with an intact circulation, it is best to stitch the placenta to the abdominal

wound and wait for secondary separation. As to the time of operation Schatz believes in immediate operation, even where the child is almost viable, as the duration of pregnancy cannot always be accurately estimated.

Investigations on the leucocytosis of pregnancy. The results obtained by Schultze-Rhonhof were opposed to those of Frau Mochnatscheff who found blood drawn from the cervix contained fewer leucocytes than blood from the finger, until the onset of labour, when the opposite obtained.

Myasthenia gravis and the female genital system. A. Wolff describes a case of myasthenia gravis, which deteriorated before the periods, during pregnancy, and especially in the puerperium, and was finally very much improved by injections of ovarian extract. The advisability of interrupting a pregnancy in such a patient is discussed, in view of the deterioration in the puerperium, and, on the other hand, the danger of the strain of labour.

Inflammatory tumours of the adnexa and early carcinoma. The simultaneous occurrence of inflammatory tumours and early cancer is less rare than appears from the literature, and two cases are described by P. Wolff. In cases with inflammation of the adnexa and erosion it is best to suspect a commencing carcinoma, and if operation is undertaken to do a total rather than a supravaginal hysterectomy. Careful microscopical examination is essential in all cases.

The function of the autonomic nervous system in pregnancy and its disturbances. It is impossible to speak of a general increase of sympathetic or parasympathetic action in pregnancy, as the effect of the autonomic nervous sytem varies in the different organs. Thus the vasomotor system shows a local dilatation of vessels in the uterus and breasts, and also at first a general vasodilatation, which changes later to vasoconstriction, and this may be excessive and lead to eclampsia. In the later months of pregnancy bodies are produced by cell destruction which sensitize the uterus to the stimuli which produce pains. The sympathetic system is specially concerned with both vasoconstriction and uterine pains. Other changes occur in the innervation of the alimentary canal, salivary glands, ureters, bronchial muscles, and sweat glands in pregnancy.

Spontaneous rupture of the cord during labour. Walz describes such a case in which the cord in a normal labour showed three separate injuries, involving all the vessels and possibly due to a bow-like twist in the cord, which was compressed during the passage of the shoulders. He also refers to the spontaneous formation of hæmatomata in the cord, and their medico-legal importance.

The treatment of acute inflammation of the adnexa by intravenous injection of calcium. A number of cases of acute salpingitis and oöphoritis were cut short by intravenous injection on alternate days of 10 cc. of 10 per cent. calcium chloride or other calcium preparation. The symptoms—temperature, pain, menorrhagia and discharge—were all reduced. The action was probably partly due to osmosis, partly an ionic one decreasing the permeability in the inflamed area, and partly an indirect protein treatment through the broken-down platelets. In the more chronic cases, direct protein therapy is preferable.

Inflammatory diseases of the adnexa. Plümecke is a supporter of early operative treatment, preferably by the vaginal route. His operation is as conservative as possible, especially before the climacteric; and the spread of infection by pus, and the formation of adhesions are prevented by the liberal use of methylated spirit.

A suppurating parovarian cyst and a dermoid of the same appendage. The parovarian cyst contained sterile pus, a condition which was thought to be due indirectly to a methyl alcohol intoxication occurring three weeks previously. It is suggested that the latter may have caused abdominal hyperæmia with increase in the fluid contents of the cyst and consequent disturbance of the nutrition of its wall.

A new method of determining the sedimentation rate in serum. A new method of distinguishing maternal from fœtal blood by determining the sedimentation rate of the erythrocytes in certain sera is described, and it is shown that the sedimentation time is the same in retroplacental and venous serum. The blood in the umbilical cord has a considerably slower sedimentation rate. This time is slightly lengthened during labour, and slowly increased in the puerperium.

The effect of X-rays on the retrogression of myomata. Yamasaki's investigations led to the following conclusions: —

(1) Autolysis is not more active in the pregnant than the normal uterus, but rather tends to be more active in the latter.

(2) Autolysis also occurs in myomata.

(3) X-rays distinctly increase autolysis in myomata, though sometimes only very slightly.

(4) From these facts it is suggested that γ-rays may also increase autolysis.

On the prophylaxis of ophthalmia neonatorum. Crédé's treatment occasionally causes serious damage to the eyes, but Israel concludes that this is due to concentration of the 1 per cent. solution by evaporation, or to the deposit of crystals at the mouth of the containing bottle. Proper precautions should be taken to avoid this, or protargol may be used instead of silver nitrate.

Zentralblatt für Gynäkologie.

No. 23, *June* 7, 1924.

*Is vaccine treatment of gonorrhœal adnexitis merely a protein therapy? E. Weinzierl.

*Icterus neonatorum and Widal's reaction. W. Simon and Z. Wellewa.

*Subnormal temperature in the new-born. P. von den Steinen.

*The resuscitation of the asphyctic new-born with oxygen. E. Holzbach.

Premature separation of the placenta by Kielland's forceps. J. Greenhill.

The symptomatology of ruptured extra-uterine gestation with effusion of fresh blood in the peritoneal cavity. A. Mandelstamm.

Cæsarean section for congenital atresia of the vagina. H. Brossmann.

Transperitoneal Cæsarean section for eclampsia. A. Wagner.

No. 24, *June* 14, 1924.

On the age and first conception of women. G. Schwarz.

*The influence of pregnancy on the growth and recurrence of malignant tumours. L. Lederer.

A contribution to the subject of spontaneous amputation of the adnexa. H. Küstner.

Life-threatening ovarian hæmorrhage. W. Lüttge.

Sub-partu perforation of a pyometrium. E. Schwarzkopf.

A case of womb stone. R. St. Hoffmann.

*The rôle of coitus in premature rupture of the membranes and in diseases of the puerperium. v. Büben.

No. 25, *June* 21, 1924.

*Determinations of serum proteins and erythrocytes in healthy and hydropic pregnant women. E. Bergmann.

The treatment of asphyxia pallida neonatorum. S. Spitzer.

Essentials in the treatment of gonorrhœal tumours of the adnexa. A. Pincsohn.

On the question: perforation or relaxation of the uterus? H. Kritzler.

The campaign against abortion. F. Lönne.

The frequency of abortion in Russia during the war and the revolution. M. Karlin.

No. 26, *June* 28, 1924.

Action of adrenalin on blood pressure in pregnant, puerperal and eclamptic women. E. Vowinckel.

Myoma of the gastro-intestinal canal. R. Apel.

A contribution to the operative treatment of misplacements of the uterus and vagina. W. Stoekel.

Operation for retroflexion and prolapse of the uterus. F. Franke.

The question of operative treatment for congenital deformities of the uterus. N. Kakuschkin.

On the conception of "Psychic Reflex." J. S. Galant

The influence of total extirpation of the uterus and the adnexa on progressive pulmonary tuberculosis in pregnancy. J. Misgeld.

No. 27, *July* 5, 1924.

*Limits of control by sense feeling in the intra-uterine application of instruments. H. Sellheim.

Constitution and race. M. Hirsch

*The Roentgen therapy of peritoneal and genital tuberculosis. W. Uter.

*On the question of the treatment of eclampsism and eclampsia. E. Essen-Möller.

Mittelschmerz and ovarian dysmenorrhœa. J. Novak.

*The application of the sedimentation rate of red blood corpuscles in obstetrics and gynæcology. B. Falta.

*The question of the method of the sedimentation reaction of blood corpuscles and its meaning in gynæcology. X. Bronnikoff.

*The question of cervical pregnancy. E. Reinhardt.

No. 28, *July* 12, 1924.

Pernicious anæmia in pregnancy. K. von Oettingen.

Duodenal stenosis from tumour in a newly-born. J. Holbaum.

Bilirubin metabolism in the new-born. E. Meyer and A. Adler.

The presence of urobilin in the stools and urine of the new-born. L. Goldschmidt-Schulhoff and A. Adler.

The controversy on Kielland's forceps. H. Saenger.

Perforation of the uterus in abortion with prolapse of intestine through a "Ursano-Dilatator." H. Hellandall.

The resuscitation of the asphyxiated new-born by increased oxygen pressure. Respiration through a Dräger-Babypulmotor. A. Wagner.

The question of inclusion blenorrhœa of the new-born and inclusion vaginitis. D. Fischer and C. Pasch.

Occult intestinal hæmorrhage in the pathogenesis of melæna neonatorum. D. v. Raisz.

Two cases of atrophy of the uterus with prolonged amenorrhœa following labour. M. Karlin.

No. 29, *July* 19, 1924.

Lipoids and ovarian function. R. Meyer.

*On back pains. Unilateral sacralization of the fifth lumbar vertebra. H. Martins.

The causes of menstrual pain. W. Schmitt.

Conservation of an accessory cornu. P. Strassmann.

Pedunculated vaginal hæmatoma in pregnancy and its origin. E. Schultze.

Gas phlegmon in a uterine myoma (physomyoma) after abortion. K. Heil.

On the formation of an artificial vagina from intestine for defect of the vagina and uterus. J. Bruskin.

No. 30, *July* 26, 1924.

*Arthropathia ovaripriva. C. Menge.

*Research on the recurrence of the possibility of conception after removal of tube or ovary. A. Mayer.

Differentiation of hæmolytic streptococci and the biology of the malign forms. G. Schwartz.

Cultivation of gonococci from the portio and urethra. W. Rother.

Significance of race in gynæcology. R. Knorr.

Twenty-five years of Cæsarean sections. F. Mann.

Genital tumours complicating pregnancy and labour. K. Burger.

*Vaginal resection of the uterus in abortion. W. Pfeilsticker.

Chloramin-Heyden and its uses in obstetrics and gynæcology. B. Storch.

New indications for the use of Thelygans. M. Ochwat.

Is vaccine treatment of gonorrhœal adnexitis merely a protein-therapy? Weinzierl answers this question in the negative. He finds that the gonococcal vaccine Arthigon exerts a decidedly specific action especially in subacute and chronic gonorrhœal affections of the adnexa, whilst native cow's milk and Caseosan are more effective in adnexal diseases of other etiology. Treatment lasted from four to five weeks. Arthigon and Caseosan were given intravenously, cow's milk was injected into the gluteal muscle.

Icterus neonatorum and Widal's reaction. Alimentary leukopenia was found in over 50 per cent. of 39 infants less than twelve hours old after the first intake, whether of colostrum, milk from the mother of a little older infant or unsweetened tea. In 77 per cent. of the infants given mature milk there was a coincident development of icterus neonatorum with the leukopenia. According to Simon and Willewa these findings indicate stimulation of the vagus by calling the digestive apparatus into functional activity, thus inducing dilatation of the peripheral capillaries with coincident leukopenia.

Subnormal temperature in the new-born. Among 300 healthy infants a temperature below 35° C. was commonly found.

Oxygen for asphyxia neonatorum. For nearly two years Holzbach has been advocating the administration of oxygen for the resuscitation of the asphyxiated newly-born. He has administered it by subcutaneous and intravenous injection, but for a year he has been administering it through the nose with constantly increasing satisfaction. The intake of the oxygen is promoted by light rhythmic compression of the chest under manometric control.

The influence of pregnancy on the growth and recurrence of malignant tumours. Lederer records several cases which indicate the unfavourable influence of pregnancy on malignant tumours. A sarcoma in the right temple of a woman aged 25 was cauterized and treated with radium, as a radical operation was contra-indicated by diffuse infiltration of the dura and the base of the skull. For nearly three years she was apparently healthy and free from recurrence; then towards the end of pregnancy the sarcoma flared up and rapidly proved fatal. In one of seven cases of cancer in the pregnant uterus Lederer merely removed the uterus at the seventh month of pregnancy, regarding the case as hopeless for the radical operation. Examination two years later, however, showed the parametrium free from malignant disease. This case shows that pregnancy does not inevitably exert an unfavourable influence on cancer. Wertheim has even reported 60 to 70 per cent. of absolute cures in cases of uterine cancer complicating pregnancy. It would seem that the transformation in the organism in pregnancy may exert a depressing effect on the defensive forces. This may be connected in some way with the cholesteræmia of pregnancy.

Coitus and diseases of the puerperium. Büben tabulates the findings in 5,000 obstetric cases at Budapest. With coitus a few hours before delivery, the membranes were prematurely ruptured in 42.1 per cent. of the primipara and in 56.2 per cent. of the multipara. The percentage was respectively 28.8 and 20.8 when the interval had been a few days; 13.2 and 11.1 with a few weeks, and 8.4 and 6.4 with a few months. The influence of coitus a few hours before delivery was evident in the 37.5 per cent. morbidity of the primigravidas with premature rupture of the membranes, and 27.2 per cent. without premature rupture. The corresponding figures for multiparas were 55.5 and 28.5 per cent. With an interval of a few days since the last coitus the figures were 20.5 and 13.8 primiparas and 22 and 14.1 per cent. for multiparas. With an interval of one month 9.5, 4 and 11.2 and 2.4 per cent.

Determinations of serum proteins and erythrocytes in healthy and hydropic pregnant women. By the employment of refractometry and erythrocyte enumeration Bergmann confirms the earlier findings of Zangemeister that in the second half of pregnancy there is a diminution in the proteins of the blood. In hydropic and nephropathic pregnant women this hypalbuminosis is somewhat greater than in normal pregnant women, but there is no marked difference in the amount in these two conditions.

Limits of control by sense of feeling in the intrauterine application of instruments. Sellheim utters a warning against the danger of overestimating the ability to determine by the sense of feeling imparted by the

curette or sound the condition of the lining of the uterus. He cites several instructive cases in illustration of this point. In one of them he had curetted the uterus four times without being able to discover any cause for slight climacteric hæmorrhage. On the last occasion withdrawal of the curette was accompanied by a small polpoid carcinomatous mass which had escaped detection during all the previous curettings.

The Roentgen therapy of peritoneal and genital tuberculosis. Uter considers that treatment by Roentgen rays surpasses all other methods of treatment of peritoneal and genital tuberculosis by virtue of the local and general improvement obtained. It does not not cause fistulæ. In the small doses employed it does not impair the genital functions. Twenty-one out of twenty-four cases were completely cured by this method : of the remaining three two were much improved and one is still under treatment. Four to six exposures were given, commencing with one-eighth to one-twelfth of the skin dose, and reducing to only a sixteenth or forty-eighth.

The treatment of eclampsism and eclampsia. Essen-Möller states that in the four years when he systematically employed the Strogonoff prophylactic treatment the death-rate was 20 per cent. He has now abandoned this method of treatment.

The application of the sedimentation rate of red blood corpuscles in obstetrics and gynæcology. Falta employed this test in over 1,000 cases and always obtained an acceleration in the rate of sedimentation in cases of pregnancy after the fourth month. The acceleration was extremely pronounced in cases of impending abortion and of hæmorrhagic endometritis after abortion. This was also the case with inflammatory processes in the adnexa, and with cancer.

The method of the sedimentation reaction of blood corpuscles and its meaning in gynæcology. Bronnikoff employs the Sahli hæmoglobinometer tube for testing the rate of sedimentation of the erythrocytes, and records the height of the plasma column at half-hourly intervals. By this means three groups of cases are differentiated, viz., non-inflammatory, chronic inflammatory and acute inflammatory. The unruptured uninfected tubal gestation can thus be differentiated from acute, but not from chronic, conditions of the adnexa. The acceleration may persist for some time after the inflammatory process has cleared up.

Cervical pregnancy. On account of the danger of hæmorrhage total extirpation is indicated whenever the implantation of the ovum into the cervix is diagnosed with certainty.

Arthropia ovaripriva. Menge describes cases of stiffness or pain or both in the knees, shoulders and joints of the fingers accompanying the amenorrhœa produced by exposure to Roentgen rays and occurring in the natural menopause. The arthropathy is usually symmetrical and persistent. It disappears in time without any treatment. Menge also calls attention to neuralgia ovarica.

The possibility of conception after removal of tube or ovary. In order to render conception possible in cases in which the tubes were diseased or had been resected, Mayer transplanted a segment of the patient's own ovary into the uterus in five cases. No untoward results were evident in any of the cases, but in one case the ovarian transplant was cast off.

Vaginal resection of the uterus in abortion. Pfeilsticker successfully treated severe hæmorrhage in fourteen cases of abortion by vaginal resection of the uterus. F. E. T.

Münchener Medizinische Wochenschrift.

No. 10, *March* 7, 1924.

New material for the evaluation of Winter's abortion forceps. K. Fuik.
The diagnosis of position of the head during labour. H. Baumm.

No. 11, *March* 14, 1924.

*Fractional castration by Roentgen rays and operation in menstrual psychosis. G. Ewald.

No. 12, *March* 21, 1924.

Death after coitus. M. Flesch.

No. 13, *March* 28, 1924.

External examination in obstetrics. R. Demme.
Dermoid cyst in round ligament. R. Hornung.
Twins and heredity research. L. Leven.

No. 14, *April* 4, 1924.

Goat's milk injurious for suckling other animals. C. Stadelmann.
Intra-uterine treatment. M. Nassauer.
Extirpation of the uterus or castration? (A reply to Sellheim.) E. Opitz.
*246 unselected cases of eclampsia without a death from this disease. (A reply to Zweifel.) Strogonoff.
Sterilization of the unfit in its medico-legal aspect. Schiedermair.

No. 15, *April* 18, 1924.

*Immunity by fertilization. A. Bier.
Observations on the value of the sedimentation rate of red blood corpuscles. H. Pibram and O. Klein.
Pregnancy after bilateral extirpation of the tubes. C. H. Lasch.
Twins and extraneous factors. (A reply to Strogonoff.) W. Weinberg.
The fundamentals of treatment of eclampsia. E. Zweifel.
How shall the German physicians deal with the question of criminal abortion? Dreyer.

No. 23, *June* 6, 1924.

*Menorrhagic action of irradiation of spleen. B. Spiethoff.

No. 24, *June* 13, 1924.

Immunity and fertilization. F. M. Lehmann.
Heredity of dwarf growth. A. Kraft.

No. 15, *June* 20, 1924.

*Biologic diagnosis of pregnancy. K. Fink.
Diagnosis of interstitial pregnancy. H. Kiehne.
Pathology of twins. L. Leven.

No. 16, *June* 27, 1924.

*Heredity of cancer. H. Wachtel.
*Population statistics. E. Maurer.
Treatment of climacteric disturbances. J. Borak.

Fractional castration by Roentgen rays and operation in menstrual psychosis. Ewald records the history of a woman, aged 46, who suffered from stuporous states which recurred at each menstruation. Castration was carried out by two applications of Roentgen rays. Menstruation then ceased, but the

mental disturbance returned at the same regular intervals as before. Two years later both ovaries were removed by operation, and after another year the uterus was also removed. The psychosis, however, was unaffected, and recurred at about the same intervals as before.

246 unselected cases of eclampsia without a death from this disease. In this series of 246 unselected cases of eclampsia there were five deaths, which Strogonoff attributes to other causes, as two had been run over by a street car, one succumbed to intercurrent pneumonia, and the remaining two were practically moribund when first seen. On these figures Strogonoff emphasizes the harmlessness and efficacy of his morphine, chloral and chloroform method of treatment of eclampsia. He insists that the prognosis is absolutely favourable in non-neglected cases. The fœtal mortality was 13 per cent., but Strogonoff credits preceding operations, exposure to cold and premature delivery with 8 per cent. of this mortality. Strongonoff again describes his technique, showing that he places most reliance on chloral, as he gives only from 0.002 to 0.04 gm. of morphine in twenty-four hours.

Immunity by fertilization. From observations on the vitality of the seeds of forest trees Bier is convinced that the cell is immunized against infection and autolysis by fertilization. Immunologic research should therefore, he believes, begin with the processes of fertilization.

Biological diagnosis of pregnancy. Binz records a case of precocious pregnancy in a girl aged ten years who had an ovarian tumour. A marked enlargement of the uterus was produced in mice by the injection of fluid from this tumour. Similar results were obtained with the contents of a parovarian cystoma, but no effect was produced with other tumours. Serum from pregnant women also produced enlargement of the uterus in mice. In the latter case eight daily injections of 0.5 cc. of serum produced this result.

Menorrhagic action of irradiation of spleen. Spiethoff attempted to restore menstruation in syphilitic and gonorrhœal girls with amenorrhœa. In the patients who had not yet menstruated the method failed, but it was successful in the others.

Heredity of cancer. Wachtel believes that Slye's observations can be applied to a large group of human cancer cases. It is necessary, however, to make careful enquiries, questioning several members of the family. There is also another group which appears to be acquired. Wachtel appears to assume that the hereditary cancer is the more malignant. He considers that in such families procreation is inadvizable.

Population statistics. Maurer attributes to nature the tendency to decrease the number of unmarried women in Germany by increasing their post-war mortality over the male mortality by 11 per cent. He does not believe that nature intends to restore the normal ratio between the sexes by increasing the percentage of males born, as this only amounts to one or two per cent. whilst the mortality of boys has increased to two or three per cent., and even four to six per cent. in Bavaria. F. E. T.

REPORTS OF SOCIETIES.

ROYAL SOCIETY OF MEDICINE.

Section of Obstetrics and Gynæcology.

First meeting of the Section held on October 2. The President in the chair.

Mr. Beckwith Witehouse showed a patient with a large swelling of the vulva. He considered it to be a sciatic hernia. The case was discussed by the President, who regarded the tumour as partly soft fibroma and partly fat. Mr. Clifford White pointed out the similarity of this case to two others recorded before the section in October 1911, by Mr. Malcolm and Mr. McCann; in both the cases the tumour was found to be a soft fibroma. The case was also discussed by Dr. Fairbairn.

The President showed, for Dr. W. B. Cosens, of Dorchester, a specimen of "Lipoma ulcerating through the vagina" and causing severe hæmorrhage in a girl of 19. The patient, a single girl, was in her usual health until May 1, when she was seized with sudden and severe vaginal hæmorrhage. On examination under anæsthesia the uterus could not be felt, but a large tumour was found pushing down the anterior vaginal wall and extending up to the umbilicus. Laparotomy was done; the body of the uterus was free from the tumour which lay beneath the peritoneum. The tumour was shelled out except over an area of about two square inches, where it was adherent to the anterior vaginal wall; in the centre of this area was a perforation into the vagina. It was found necessary to remove the uterus with the tumour as there was an abscess cavity extending from the cervix to the adherent portion. The specimen so obtained was found to contain a solid and a cystic portion. Microscopic examination showed the structure of a rapidly-growing leiomyoma.

The specimen was discussed by Dr. Eden and Dr. Stevens.

Dr. J. S. Fairbairn and Dr. J. Taylor showed a specimen of "simple ovarian embryoma with spread into contiguous structures." The specimen was removed from a multiparous married woman of 49, who had complained of occasional abdominal pain. Menstruation was unaffected, there had been no disturbance of micturition and the general health was good. Bimanual examination showed the uterus in front, slightly enlarged and freely movable, pushed forward by a large swelling filling up the pelvic cavity and extending into the abdomen to about two fingers breadth above the pubes. The swelling was inelastic and putty-like in consistence. At operation it was found to be a dermoid cyst of the right ovary occupying the sacral hollow. The round and ovario-pelvic ligaments and mesosalpinx were stiff from infiltration, so that there was unusual difficulty in freeing the cyst so as to secure the pedicle. The infiltration of its attachments suggested the possibility of malignancy, and therefore it was decided to remove the uterus and appendages of both sides. The specimen so obtained was found to be a dermoid cyst with infiltration of the surrounding structure by the cells of the tumour. Dr. Fairbairn proceeded to discuss whether

the infiltration was malignant or inflammatory and came to the conclusion that it was an inflammatory infiltration by fatty granulation tissue.

The specimen was discussed by The PRESIDENT and Dr. STEVENS.

A short communication was read by the PRESIDENT on

AN UNUSUAL RETROPERITONEAL TUMOUR.

The patient was a multipara, aged 42, who had had pain in the right side of the abdomen for three years. Menstruation was fairly regular, the loss was small. On abdominal examination an irregular mobile mass, more or less cystic, filled the abdomen, reaching up half-way between the umbilicus and the ensiform cartilage. The uterus lay to the right and free from the tumour. At operation it was found to be retroperitoneal with the ascending colon running over it. As it appeared to be composed largely of fat he decided to remove it. In doing so, and while separating the upper part from the liver a necrotic patch gave way and about two pints of dark, odourless fluid escaped. This was suggestive of sarcoma and therefore the tumour was removed whole, necessitating tying the renal vessels and removal of the right kidney. The patient recovered, but three months later had a large mass in the right loin.

Examination of the specimen obtained at operation showed that the tumour was encapsuled and lay behind the peritoneum. It enveloped, but did not invade, the right kidney. It consisted mainly of lobules of fibrous adipose tissue; one large lobule contained spindle-celled fibrous tissue, having the characters of a fibro-sarcoma.

But the cells were arranged in well-defined bundles and were uniform in size and shape and the lobule was limited by a fibrous capsule. He regarded the tumour as a retroperitoneal fibro-lipoma with a focal area of fibro-sarcoma of histologically low malignancy.

The subject was discussed by Dr. STEVENS; by Dr. FAIRBAIRN, who referred to a paper read by Mr. Alban Doran on " Retroperitoneal lipoma " at the June Meeting of the Obstetrical Society in 1902; and by Dr. MARTINDALE, who mentioned a case of retroperitoneal sarcoma in a woman of 52, who came under her observation two years ago. The condition was then inoperable, but was greatly improved by intensive X-ray treatment.

A paper was read by Dr. J. MARRACK on

THE PLASMA PROTEINS IN NORMAL AND ABNORMAL PREGNANCY.

The paper represented the results obtained by L. J. Coetzee upon work carried out in the Hale Clinical Laboratory, London Hospital. The plasma proteins of women, normal and pathological, were compared with those of normal men, non-pregnant women and those of patients with conditions which affect the plasma proteins. The changes in plasma proteins in normal and abnormal pregnancy differed from those produced by the injection of foreign proteins. It was suggested that absorption of foreign proteins may occur in pregnancy, but that the normal protective response fails, especially in eclampsia. Changes similar to those found in nephritis occurred in cases of pregnancy in which there was evidence of kidney damage alone, but in toxæmia of pregnancy and eclampsia the changes characteristic of renal damage were much modified.

The paper included references and also several valuable tables of the fibrinogen, albumen, and globulin ratios in various conditions. The paper was discussed by Dr. V. LACK and Dr. EVERARD WILLIAMS.

THE MIDLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

The Annual Meeting of the Society was held at the Medical Institute, Birmingham, on Tuesday, October 14th. The President Elect, Dr. THOMAS WILSON (Birmingham) was inducted by the retiring President, Dr. C. D. LOCHRANE (Derby).

The officers and council for the ensuing session were elected, and the annual reports of the Council and the Treasurer were presented and adopted.

Dr. R. G. ABRAHAMS read a paper on

THE PATHOLOGY OF PUERPERAL SEPSIS.

He said that he deeply appreciated the honour bestowed upon him in requesting him to open a discussion on Puerperal Infection. He pointed out that during the last 24 months permission for autopsy had only been afforded him in some dozen cases of puerperal sepsis, and that during this period there have been more than 25 deaths from this cause in the Women's Hospital at Sparkhill alone.

By the courtesy of the honorary surgeons at Sparkhill he had been enabled to study all their septic cases in the wards at leisure, and thus, together with certain laboratory investigation, had been able to form what he believed to be a logical view of the morbid processes involved in this disease.

In the Ingleby Lecture of 1912, Mr. Furneaux Jordan described three main clinical types of the disease, viz :—

1. A mild type of case which responds rapidly to simple hygienic measures and which invariably recovers when placed under suitable conditions.
2. A very severe type with all the features of a profound septicæmia, and which is very frequently though not invariably fatal, and
3. A very severely infected type presenting a prolonged febrile course and of uncertain prognosis.

He was in entire agreement with this division into types as he found ample pathological evidence of the existence of the two latter types, and considerable bacteriological confirmation of the existence of the first or mild type. Let him explain a little more fully what he inferred from his examinations, and to achieve this he proposed to deal briefly with each of Mr. Jordan's clinical types.

1. Mild Type. A bacteriological examination of an intra-uterine swab in many instances has shown either (*a*) a pure culture of a hæmolytic streptococcus identically similar to the streptococcus found in many of the severe cases, or (*b*) the same streptococcus in association with other organisms, some definitely pathogenic, others possibly harmless saprophytes. He should like to say something further about these streptococci, but suffice it to say that he considered the relationship of the mild type to the more severe cases proven. Pathologically these mild cases are the result of an inflammation strictly limited to the endometrium. The lochial discharge in such cases, though foul at first, soon ameliorated in character, and involution was not delayed. Broadly speaking, the resistance of the endometrium was high and repair was rapid.

2. Septicæmic type. The uterus was much enlarged, subinvoluted and soft. The external os projected into the vagina, and showed much swelling, greenish-black discolouration, was very friable, and may present lacera-

tions of a ragged character. The uterine cavity showed similar greenish-black necrotic tissue, and on section the fibro-muscular wall was greyish-red in colour and very œdematous. The vessels, especially the veins, were much enlarged, and filled with fluid blood. The Fallopian tubes contained turbid dark fluid.

The changes in the other organs were, with certain points of difference, to which he would refer immediately, similar to those customarily met with in fatal septicæmia. The spleen was enlarged and soft, and on section the pulp was extremely friable and very deep purple in colour. The liver and kidney showed swelling and fatty changes. The large serous cavities contained small quantities of turbid or slightly blood-stained fluid.

In addition to these findings, the tissues were universally blood-stained. The endocardium and aortic intima were red, and over the thorax and limbs there was often seen a network of broad brown or purplish lines, which indicated staining of the skin from the blood in the cutaneous veins. These latter appearances were not found, generally speaking, in septicæmic disease, but were peculiarly characteristic of septicæmias produced by hæmolytic agents, notably the hæmolytic streptococci, which sometimes could be obtained in pure culture from the blood in life. Obviously, here we had resistance at a low ebb, and a virulent infective agent at work. Many blood vessels had been torn open at the time of separation of the placenta, and immediate infection of the blood stream resulted.

3. Prolonged Type. When the resistance of the tissues was not quite so readily overcome as in the septicæmic type, for a time the process which originated in the uterus remained more localized, and a variety of appearances could be met with. In many of these prolonged cases it became difficult to demonstrate the presence of the streptococcus, by reason of the entry of putrefactive organisms, which in cultures outgrew the initial organism.

A very general finding at autopsy was a large soft subinvoluted uterus containing an extremely foul putrid mass of necrotic tissue, but more rarely the cavity was lined by a fibrino-cellular exudate, which formed a false membrane comparable to that seen in faucial diphtheria.

On microscopical section the uterine wall was densely packed with inflammatory cells, while macroscopically areas of œdema and septic thrombi were seen. Direct infection of the peritoneal cavity or infection spreading through the Fallopian tubes could very easily hasten the issue.

Occasionally delayed septicæmia resulted in this type by spread of infection *via* the lymph channels to the thoracic duct, the bacteria finally finding their way into the blood stream. More frequently the course of the disease was complicated by the formation of infected thrombi in the veins. Thrombosis in branches of the veins at the placental site was a normal condition post-partum, and in absence of any obvious septic infection thrombosis in uterine and pelvic veins was also frequent. As long as the thrombus remained non-infected it eventually organized, and the lumen of the vessel became partially or wholly obliterated. If, however, septic organisms entered the thrombus, the latter softened and portions could break off and be swept into the blood stream.

Whence arose the infective agent? How and why did it enter the uterine cavity? or was it already there at the time of delivery? Mr. Victor Bonney said the bacteria came in most cases from the rectum of the patient, but perusal of his paper communicated to the Section of Obstetrics and

Gynæcology of the Royal Society of Medicine, in October 1919, was without pathological support of his contention.

Dr. Watts Eden, in his address to the Midland Medical Society in October 1922, on "The Maternal Mortality of Child-bearing," said that—"Puerperal infection was a dirt disease like erysipelas and wound infection in general, and the organisms which caused it are the same as those which caused these latter diseases."

He was not in agreement with either of these views, and although not wishing to minimize the importance of simple—he emphasized the word simple—anti-septic technique in the conduct of normal labour, and also of avoiding vaginal examination until expulsive pains begin, he believed that in a very large number of cases of puerperal sepsis, we have to deal, not with a "dirt disease," but with infection with a definite and specific organism.

He would draw attention again to Mr. Jordan's paper, wherein he stated that a streptococcus of peculiar but constant cultural characteristics was isolated in 17 cases in a total of 25, *i.e.*, in about 70 per cent. Dr. Leonard Mackey had recently shown him his records of bacteriological investigations of the septic puerperal uterus, and he obtained this identical streptococcus in over 100 cases.

During the last two years in the examination of 120 swabs from the septic puerperal uterus he found this streptococcus on 63 occasions, and in 44 it existed in pure culture.

Other pyogenic cocci, coliform bacilli and diphtheroid bacilli were found in a large proportion of the remaining swabs, but no streptococci. On the whole these latter swabs were received from cases clinically milder than the former streptococcal cases.

Dr. J. Henry Dible, in his paper to the Section of Pathology and Bacteriology British Medical Association, Annual Meeting, in 1921, pointed out that the streptococcus fæcalis, though occurring occasionally in other situations, is essentially a normal inhabitant of the lower bowel, while all the other well-recognized varieties of streptococcus—both hæmolytic and non-hæmolytic—occur relatively infrequently in the fæces.

The streptococcus fæcalis is one of the non-hæmolytic varieties, while the variety found so often both by Dr. Mackey and himself was indisputably hæmolytic. The property of hæmolysis is a fairly constant one, and it is difficult to reconcile the view that we should regard rectal infection as the *fons et origo* of the majority of cases of puerperal sepsis, and refute the idea that the causal organisms of common wound suppuration and erysipelas are also responsible for puerperal infection.

The important characters of the hæmolytic streptococcus of puerperal sepsis are briefly as follows:—

On fresh blood-agar media it forms circular opaque discrete colonies, which are as a rule rather larger than the colonies of streptococcus pyogenes, the common streptococcus of wound infection. The colonies resemble very closely those of staphylococcus albus, for which they might be easily mistaken. In bouillon it forms chains of moderate length and shows little tendency to clumping. With little variance, it produces an acid fermentation in glucose, lactose, and saccharose, but has no action on inulin or mannite; it splits salicin and clots milk with production of acid.

In 20 per cent. of apparently healthy pregnant women streptococci could be found ante-partum in the vagina, and sometimes—though less frequently—in the cervix. It is well established that certain streptococci may exist

at one time in the rôle of harmless saprophytes, at another as virulent disease-producing organisms, and that they had certain mutatory power. It is conceivable that the variety or varieties existent in the healthy passages before labour could be endowed with potential virulence. He suggested that unskilled midwifery and resultant introduction of foreign matter into the vagina, including previously harmless saprophytic bacteria, could establish a symbiosis which favours the change of character in the streptococci already there.

This was a point he had not had the opportunity of pursuing, but he would plead for bacteriological examination of the cervix before labour in our maternity wards, and also for a second examination immediately after labour. He felt assured that no harm could result from such a procedure carried out skilfully, but perhaps much useful information.

Mr. FURNEAUX JORDAN referred to the work done in preparing the Ingleby Lecture for 1912. He stated that Dr. Mackey made exhaustive search for the hæmolytic streptococcus in conditions other than the infected puerperal uterus but was unable to find it, until he isolated it from the naso-pharynx of a doctor who had had a run of cases of puerperal infection, in spite of rigid technique.

As regards treatment he was a firm believer in the efficacy of autogenous vaccines, and thought that local treatment should be as limited as possible.

Mr. CHRISTOPHER MARTIN asked whether, in view of the statement that the same hæmolytic streptococcus was found in all cases of bad puerperal sepsis, it was not possible to prepare a stock vaccine for use in the septic wards. He also wished to know whether this specific streptococcus could be found in a vaginal swab taken during labour as an aid to prognosis.

Dr. C. D. LOCHRANE thought that the bowel was the source of the infecting organism in most cases, and suggested that the streptococcus fæcalis developed virulent hæmolytic properties.

The President, Dr. THOMAS WILSON, considered that puerperal infection was a much wider condition than that defined by the opener as due to one specific germ. He recognized three classes of puerperal sepsis: pyogenic, saphrophytic, and gonococcal. His personal experience had not convinced him of any great utility in the use of vaccines for these cases.

Dr. EDGE and Dr. PURSLOW took part in the discussion, and Dr. ABRAHAMS replied.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

A meeting of the Society was held at Liverpool on Friday, October 17, 1924, the President, Prof. DONALD (Manchester), in the chair. Three new members were elected.

Prof. W. BLAIR BELL described a case of

MANUAL PERFORATION OF THE PUERPERAL UTERUS.

(See page 649 in this Journal.

Professor BRIGGS (Liverpool) remarked on the escape from gross infection during and after the labour; embarrassment from inacquaintance with the interior of the full-term uterus after a complete labour pointed to more practical work in museums and class-rooms.

Dr. WILLETT (Liverpool) commented on difficulty in removing the placenta in certain cases, and referred to a specimen in the University Obstetrical Museum, in which the placenta could not be separated in the laboratory after the uterus had been removed.

Prof. DONALD emphasized the facility with which the uterus can be perforated in the puerperium, especially if infected.

Prof. BLAIR BELL also described a case of

THROMBOPHLEBITIS OF THE RIGHT OVARIAN VEIN

associated with abscesses in the uterine wall. (See page 647 in this Journal.

Prof. BRIGGS gathered that the bacterial infection in this case was that of a mild character and the lymphatic inflammation was localized.

Mr. LEYLAND ROBINSON (Liverpool) inquired as to the clinical symptoms suggestive of thrombosis of the veins, and inquired if these were palpable per vaginam.

Mrs. DOBBIN CRAWFORD (Liverpool) reported a

PRIMARY CARCINOMA OF THE VAGINA.

The patient came to me on November 2nd last complaining of backache and pain on micturition, and mentioned casually that she had seen a blood-stain on her sheet on one occasion three weeks before. She was a very energetic old lady of 68; her family history showed that she had four children all healthy, born in normal confinements without forceps or other interference. She said she had never been ill in her life. She had never had any prolapse or any vaginal discharge and had never worn a pessary.

Her husband had died two years previously of gastric cancer.

The upper part of the vaginal wall in front and to the left was extensively occupied by several flat bluish-purple bosses, not visibly ulcerated but absolutely fixed to the underlying structures and so infiltrating the tissues above the left fornix that the cervix could not be drawn down at all. The cervix was perfectly normal, without laceration or erosion, and was not encroached upon by the tumour. The uterine body was normal in size and position and there was no discharge from the cervix.

Cystoscopy showed a dusky red area about the size of half a crown in the base of the bladder. The urine was free from albumin and pus.

Regarding the case as hopeless I curetted the tumour and cauterized it with chloride of zinc. A section of the scrapings is under the microscope and shows a squamous-celled carcinoma.

The dysuria improved with rest in bed, but towards the end of December the tumour ulcerated into the bladder, and repeated hæmorrhages caused intense pain through the passage of clots by the urethra. This pain was relieved later by the spontaneous formation of a vesico-vaginal fistula The patient died on February 18th, four months after her first complaint.

The chief points of interest were: First, the situation of the cancer. Second, the type of carcinoma, corresponding to the rarer of the two forms described, an infiltrating tumour spreading beneath the epithelium and ulcerating at a very late stage. This type is said to occur in only 10 per cent. of primary carcinomata of the vagina.

The President (Prof. DONALD) opened a discussion on

THE TREATMENT OF MOBILE BACKWARD DISPLACEMENTS OF THE UTERUS.

An abstract of which may be shortly summarized:—

Significance of backward displacement: difference of opinion amongst

writers; the beginning of the passive congestion theory; later explanations; objections to the congestion theory; retroversion *not* the cause of endometritis or chronic metritis; difficulties in explaining the effects sometimes produced by a pessary.

Conclusions arrived at as a result of investigating the symptoms:—(1) Complications are generally the only things that matter in cases of retroversion. (2) The complications are: (*a*) disordered uterine function; (*b*) increased weight; (*c*) prolapse; (*d*) adhesions. (3) None of these complications are produced by retroversion. (4) In a small proportion of cases an apparently simple retroversion causes local pelvic discomfort and even a certain unexplained effect on the nervous system. (5) The treatment of retroversion is nearly always the treatment of complications. More than 90 per cent. of the patients seek relief from symptoms which are common to all cases of endometritis and chronic metritis, and for these curetting is nearly always advisable. A series of cases in which curetting has been the only treatment is recorded.

Mechanical treatment is (*a*) by pessaries, and (*b*) by fixation or suspension operation. Pessaries seem of use as a temporary measure in cases of sterility and early pregnancy, and very occasionally in uncomplicated retroversion. There are far too many operations for fixing and suspending the uterus. The great majority are unnecessary, and many of them are harmful.

Prof. Henry Briggs imagined a student, ignorant of all gynæcology, including its nomenclature, would naturally classify the backwardly-displaced uterus within the pouch of Douglas as a hernia and aim at the strengthening of the deep portion of the pelvic floor and the rectification of the position of the uterus. The earlier the effort the better the prospect of the radical cure of a hernia. In this country, he remarked, a revolution is disliked and progress is steadied by a study of history and requirement. There are gaps in the foreground. It is more than singular to have to acknowledge, for example, that the best use of a 3 or $3\frac{1}{4}$ inch ring pessary was advocated 24 years ago by the late Sir William Sinclair (*Trans. Obstet. Soc.*, 1900) in the treatment of the retroflexed gravid uterus; even to-day this advance is not to be found in the obstetrical text-books. Prof. Briggs had not the least doubt that a pessary *in situ* and frequent urinary catheterism, in gentle and persistent effect totally outclassed manual reposition. Similarly the best use of the curette in the completeness of the removal of the necrotic tissues from a normal base seven to ten days after an incomplete—not a septic—abortion lodged its telling contrast on the incompleteness which a backwardly displaced uterus does not lessen, in the treatment of endometritis.

Dr. Fitzgerald (Manchester) agreed that not all retrodisplaced uteri required treatment; symptoms accompanying the displacement were not necessarily due to it; the important matter was to find what treatment would give the best results. If the curette can show results equal to abdominal section, then the minor treatment is to be preferred. He curetted all cases that produced symptoms, and only rarely found more radical treatment necessary.

Dr. John E. Gemmell (Liverpool) said: I am in agreement with Prof. Donald that simple mobile retroversion in single women is symptomless in the majority of cases. In parous women, however, I am of the opinion that this displacement is, in itself, capable of producing a definite train of

symptoms. I cannot help thinking that there is a world of difference between an organ that is developed in a particular position of version, and one that acquires such a position : the one is in its proper physiological place, the other has acquired a pathological displacement : the vessels of the former have been congenitally adapted to meet the requirements of the retroverted uterus and can do so smoothly and without embarrassment to the circulation, whilst in cases of acquired retroversion the vessels share in the displacement and are thereby exposed to abnormal pressures that chiefly fall on the veins and consequently lead to back-pressure and congestion.

The resulting symptoms *simulate* endometritis and metritis, but I believe they are essentially due to congestion, the result of acquired displacement, and I am therefore a supporter of the mechanical theory and consider there are three clinical types that demand correction and fixation :

(1) In a limited number of congenital cases when the patient complains of sterility, repeated abortions, dysmenorrhœa, or dyspareunia : the type with neurosis and backache is expressly excluded.
(2) In obstetric types with the following cardinal signs—a bulky, tender, œdematous and often incarcerated (but not fixed) uterus, associated with pain, menorrhagia, leucorrhœa, or dyspareunia.
(3) In cases of simple retroversion accompanied with early prolapse in young women of child-bearing age.

Although pessaries and general therapeutic measures are useful adjuncts, and may even be curative in mild cases, I wish to limit myself to the surgical treatment of this condition, and propose to base my remarks upon 125 cases of simple retroversion that were published in the *Lancet* of June 18th, 1921, in collaboration with Mr. Leyland Robinson, who has kindly extracted the following details from that paper.

The clinical details and operative results of these cases may be summarized in the following tables :—

Parity—Single	... ...	17	women
Married	... ...	108	„
Age—under forty years	... ...	97	„
Symptomatology—abdominal pain	...	91	„
backache	... ...	69	„
dysmenorrhœa	...	72	„
menorrhagia	... ...	67	„
leucorrhœa	... ...	40	„
sterility	... ...	27	„
dysuria	... ...	19	„
repeated abortions	...	12	„

Results of treatment by ventral fixation :—

Cured of symptoms	... ...	108	women
Still complaining	... ...	17	„

Of the latter seventeen cases, seven women had had children subsequent to operation, and their complaints were due, in some cases, to the effects of labour, and were entirely independent of their original trouble and not associated with the operation. Of the remaining eleven, three had been free from complaint for four years, and another for seven years, and four were suffering from pronounced neurosis; all of them qualified their statements by adding " slight," " occasional," or " sometimes."

Summary of results : 85.6 per cent. cured; 10 per cent. relieved; 4.4 per cent failures.

The principles of ventral fixation are not generally understood, and I believe that this procedure has acquired an unpopular reputation because most gynæcologists have studied the wrong type of operation. The type we practise was planned to fulfil the three essentials upon which the success of all gynæcological operations depends, namely : (1) Freedom from immediate risks, such as intestinal obstruction. (2) Freedom from the risk of interfering adversely with subsequent conception and parturition. (2) Ability to relieve symptoms.

The proof that ventral fixation meets these requirements is furnished by the following facts :—(1) Of upwards of 700 ventral fixation operations performed by me, one patient died from sepsis under circumstances that had nothing to do with the operative procedure : the patient became unmanageable, removed her dressings and escaped from the ward to the lavatory on the day after the operation. There were no examples whatever of post-operative strangulation of gut. (2) Of 220 cases in which a complete after-history was obtained, 63 women subsequently became pregnant, and were safely delivered of 104 children without a single case of dystocia or stillbirth. (3) The effect of ventral fixation on symptoms has already been dealt with (85.6 per cent. cures).

Successful operative technique depends upon three chief factors : the choice of a suitable fixation point; the prevention of adventitious intraperitoneal bands and holes through which gut might strangulate; and the achievement of a fibromuscular fixation and *not of a peritoneal* suspension.

Fixation point. Operations which fix the fundus, or anchor the upper part of the uterine body, are naturally prone to accidents which demonstrate the danger of such methods; these accidents have also been widely advertized to discredit the principle of ventral fixation. The level of the utero-vesical fold is unaffected by the changes of pregnancy and remains passive during labour, and may therefore be described as a normally fixed point. There can be no serious anatomical or physiological objection to fixing a point that is already stationary, and I therefore select this area as my fixation point and attach it by means of two silkworm gut sutures to the rectus fascia immediately above the symphysis pubis.

The prevention of adventitious bands is brought about by the construction of a bladder septum; the peritoneum covering the bladder is picked up in a series of Spencer Wells' forceps from the utero-vesical reflection above to the parietal peritoneum below at the lower angle of the incision. A fold is thus made across the middle of the utero-vesical pouch, through which a continuous catgut stitch is run, tied and lastly attached to the fascia just above the symphysis pubis. This septum obliterates the supra-vesical space that would otherwise persist below the fixation area, and forms with the new supporting ligament one continuous wedge-shaped structure that effectually eliminates the possibility of loose bands or peritoneal holes. It should be noted that the septum is formed of peritoneum only and plays no part in supporting the uterus.

The efficiency and permanence of both the septum and the new fibromuscular ligament, have been repeatedly seen at long intervals after the original operation when such patients have returned with other lesions requiring abdominal section.

My remarks may be summarized by saying that I believe retroversion

to be a mechanical defect that is competent to produce symptoms, and that I am convinced of the utility of the operation of ventral fixation.

Mr. W. Gough (Leeds) agreed that many patients with retro-displacements were symptomless. If they were told of the retro-displacement, a vicious cycle might be set up. Briefly his practice was: If no symptoms, leave alone; if symptoms were present, he curetted the uterus and replaced it. If the displacement recurred, the uterus was replaced and a Hodge pessary inserted for two to three months. If the patient was thereby relieved, nothing further was done, but if her symptoms returned then he operated. He had done all types of operation except the absolute fixation and found them all equally successful.

Mr. Robert A. Hendry (Liverpool) read the conclusions abstracted from the opening report on the "Indications for surgical intervention in retro-deviations of the uterus apart from pregnancy," presented to the Congress of the Association of French-speaking Gynæcologists and Obstetricians, Geneva, 1923. These were that surgical intervention in uterine deviations, apart from pregnancy, is indicated as follows:—(1) In retro-deviations accompanying uterine, ovarian, or parovarian tumours in so far as these tumours do not necessitate the sacrifice of the uterus; the pexy is a complementary operation. (2) In fixed, painful retro-deviations. (3) In fixed, retro-deviations accompanied by appendage lesions, unilateral or bilateral, which have resisted medical treatment. If the appendage lesions are such that they require ablation it may be necessary to practice total or subtotal hysterectomy; if such be not the case, the uterine pexy is only a complementary operation. (4) In painful, mobile retro-deviations surgical intervention is only indicated if, when the uterus be replaced, the painful phenomena disappear. In other cases the pains arise: (*a*) from hysterical state; (*b*) from multiple visceral ptoses. (5) In certain rare cases of obstinate sterility where no other apparent cause can be discovered. (6) In retro-deviations accompanied by repeated abortion where searching examination eliminates the possibility of syphilis. (7) In all cases where, in addition to the retro-deviations, one finds a tendency, even if slight, to prolapse with or without perineal lesions. If the perineum be damaged the pexy ought to be preceded by careful vagino-perineal repair. (8) Painless mobile retro-deviations do not require any treatment.

The discussion was adjourned until the next meeting to be held at Sheffield, on Friday, November 21.

EDINBURGH OBSTETRICAL SOCIETY.

At the meeting of the Edinburgh Obstetrical Society held on March 14th, 1924, the President, Prof. Watson, in the chair, Dr. C. E. Douglas read a paper on:—

Some observations on seventy years of country midwifery practice, which appears in this Journal, page 622.

Dr. Haig Ferguson said: We have just heard a strikingly interesting address. I have never heard in this Society such a beautifully written paper, or one with such a variety of classical and literary illustrations. On the whole the paper strikes an optimistic note as regards present-day obstetric treatment. Dr. Douglas said that 3 per cent. of all puerperal women are liable to autogenous infection and I am inclined to think that

he is not far wrong. This shows that ordinary precautions are powerless to prevent infection in a certain number of cases, and it calls therefore for a more careful investigation of women before labour to find out which of them are in this dangerous condition. Certain investigations are on foot at present which rather bear out Dr. Douglas's statement, and the question comes to be whether it will not be necessary systematically to examine the vaginal secretion in all women before confinement and to ascertain whether any pyogenic organisms are present. Dr. Browne is at present doing some good work in this direction in the Maternity Hospital. Dr. Douglas seemed to indicate that forceps are not so frequently used now as they were. I am inclined to think that they are used more frequently than in former days. One cannot, of course, compare the indications of forceps application in the old days with those of the present. In former days the application of forceps was almost invariably delayed too long until the patient was exhausted and almost *in extremis*. Nowadays the tendency is perhaps in the other direction and they are sometimes applied too frequently and certainly sometimes too soon. I agree with Dr. Douglas that forceps judiciously applied is a most important factor in saving rupture of the perineum. The worst cases of torn perineum that I have seen have been in cases of so-called natural labour. Forceps judiciously applied in suitable cases and at a suitable time do nothing but good, but it takes considerable experience before a practitioner finds out their full advantages and limitations. The young practitioner goes out into practice very frequently without having had any experience in the use of forceps and his earlier patients I fear are apt to suffer from this. One hopes that in the future more practical teaching may avert this difficulty, which will be a great advantage to the community. Dr. Douglas seems to regard version as being an operation seldom used nowadays. I hardly agree with this view, as version is still regarded as extremely useful and must not be relegated to the past. We all join in hoping that Dr. Douglas will ere long give us other papers, which he is so well qualified by his wide experience to do.

Dr. FORDYCE said: This is one of the most interesting papers I have heard, and it is the sort of paper we have pled for from our general practitioners for a number of years. I would like to think with Dr. Douglas that it is a mistake that the mortality from childbirth has not decreased in seventy years, and I do think that Dr. Douglas has brought forth adequate reasons why that should be so. He proved it in his own practice. Of course the personal element must be taken largely into account. Anyone who knows Dr. Douglas knows that he would treat these cases with exceptional skill and care, and this would account for a decreased mortality as his experience extended. The other factor, of course, is that Dr. Douglas is dealing with a class of patient which is different from, one might say, the average patient. The crowded life of towns nowadays must, of course, diminish the vitality of people and that should be taken into account. I hope that the mortality really is diminishing in spite of what Berkeley and Bonney say. Dr. Douglas spoke about the fœtal mortality in his cases of forceps and gave us his percentage. I would like to ask him if he has any record of the fœtal mortality in the cases where he did not apply forceps. I agree that version has not passed out. Years ago in this Society there were fierce discussions as regards the relative merits of forceps and version in minor degrees of contraction of the pelvis. Professor Simpson was a strong advocate of the value of version and frequently employed it

himself in cases in the Maternity Hospital where now we would put on forceps. Regarding one historical point—the Mrs. Dombey type of case. I have often wondered exactly what Mrs. Dombey died of. Dr. Douglas seemed to indicate that it was because she did not make an effort! It is true that Mrs. Chick was constantly urging her to make an effort, but Dr. Douglas must remember the anxiety of these efforts after the child was born. I think that probably Mrs. Dombey may have been a very energetic woman and that it is quite possible she died from hæmorrhage afterwards and not from the results of inefficiency on her own part.

Dr. JOHNSTONE said : I was glad that Dr. Douglas went into the question not only of mortality but also of morbidity. Particularly in regard to sepsis there is a tendency to take mortality as the standard to the exclusion of morbidity. This, after all, is an exceedingly important matter, because, apart from the number of women who die, the question comes really to what Dr. Douglas practically described as his " efficiency test." How is the efficiency of women affected then, if they recover from puerperal infection? So far as my experience goes, I think that in many cases where recoveries take place the general efficiency is materially diminished. I don't think that any woman ever suffers from acute general septicæmia without its leaving a considerable scar on her life history. I entirely agree that, if forceps were never applied until the cervix is fully dilated, the controversy with regard to the use and abuse of forceps would practically cease. With regard to Dr. Douglas's closing points there is no doubt that it is ludicrous to compare parturition as a physiological process with other physiological processes such as the evacuation of the rectum or bladder. All these processes are performed in the interest of the individual; parturition is performed in the interests of the race and is on an entirely different physiological plane from the others. What Dr. Douglas said with regard to the possibility of there being a lowered resistance in women during pregnancy and parturition is certainly very suggestive. There are probably many elements to consider. He asked the question why should a woman die of a septic perineal tear when she would probably not suffer much from the tear if she were not pregnant? One reason is probably the enormously increased lymph vascular supply which is developed during pregnancy and which is laid down by Nature in order to permit rapid absorption of tissue in the course of the puerperium. While in a healthy puerperium this arrangement is of the utmost value, it becomes of the most sinister significance possible when organisms are introduced.

Dr. YOUNG said : One of the most important matters dealt with in Dr. Douglas's address is the rôle played by endogenous or autogenous infection. Dr. Douglas's paper will attract attention to this extremely important point in regard to obstetric practice in so far as it affects the question of morbidity and mortality. I have always had a feeling that this subject of autogenous infection has been neglected in the past. The figures that Dr. Douglas has put forth to-night have a suggestive bearing in this connexion and imply that in a certain proportion of cases the raw pelvic surfaces are infected by microbes that may up to that time have been latent in the woman's body. If this mode of infection can be established it means that we have got to settle down to an entirely new method of attack on this problem, and one would like to see a wholesale series of investigations carried out along these lines. The latter part of Dr. Douglas's paper interested me very much, where he touched on questions of more philosophical interest—

questions which relate more to the factors of comparative biology and pathology. I remember some years ago to my shame being entangled in a correspondence in one of the medical journals on the ultimate nature of pregnancy and how far pregnancy was to be looked upon as a pathological process and how far a physiological process. I took up the attitude that pregnancy was very closely related to a pathological condition, and I remember instancing the examples which Dr. Douglas has given us to-night of the praying mantis and the spiders. One would like to see Dr. Douglas elaborate these points.

Dr. BROWNE said: To my mind the incidence of puerperal sepsis will never be diminished materially until it is recognized that the autogenous sources of infection are of importance in its causation. One of the chief sources of this is the vagina which, I believe, frequently contains organisms during pregnancy which are potentially pathogenic and which even though kept in abeyance by the acid contents of the vagina before the onset of labour may during labour and the puerperium, when the degree of acidity is diminished, become sufficiently virulent to cause puerperal sepsis. Investigations along these lines are being carried out in the Maternity Hospital.

Dr. H. G. LANGWILL expressed the appreciation of the general practitioners and referred to what he called the " Osler touches " in Dr. Douglas's paper.

The President, Professor WATSON, said: Dr. Douglas has done a great service in two ways: he has given us authentic figures with regard to puerperal mortality and morbidity, and he has shown that we cannot rely on the official statistics with regard to these conditions in the Registrar General's returns. Whilst the figures may be comparable, say for the last twenty years, they are certainly not comparable now and fifty or seventy years ago. It is questionable if the present-day figures and those of the last twenty years are comparable with each other, because there is no question that registration of these deaths is much more conscientiously done now than it was say twenty years ago. These are things we must take into consideration seriously in estimating whether we are getting any better results to-day than were obtained twenty or thirty years ago. Dr. Douglas has done a great service in bringing up his last point as to whether there is not in a pregnant woman a greater tendency to disease and to death than in the non-pregnant patient. I think we undoubtedly see that for example in tuberculosis, and it was forcibly brought home to us in the influenza epidemic when women went into labour with pneumonia. The mortality was as much as 30 per cent. in these cases, showing that these women had a lower resistance and that any endemic disease is a more serious thing in the pregnant than in the non-pregnant woman. That, of course, means that in our treatment of women in labour aseptic treatment must be more perfect if possible than our technique in ordinary surgical operations; that point requires emphasis. In ordinary midwifery practice the antiseptic or aseptic principle has not been followed as it has been in our surgical operating theatres. It is doubly necessary to carry out that technique perfectly in labour.

In reply, Dr. DOUGLAS said: I thank you heartily for the patient way in which you sat through that very long paper. With regard to Mrs. Dombey I should like to say that in those days they did not die of sepsis, they died of exhaustion. That scene in which the doctor and the specialist who was brought in is one of the cruellest descriptions that Dickens has ever given.

He was, of course, largely a democrat, and was not at all fond of the professional classes, and that description of the doctor and of the man in general practice at the bedside of Mrs. Dombey is something that we all ought to read. Those who know John Galt's writings I hope have read the latest series of short stories called " The Howdie and Other Tales. In that you will notice that every case died that day or the next day. If Mrs. Dombey had died of sepsis Dickens would have made her die a fortnight hence, but she died that same day. That brings out exactly that in those days they did not die of sepsis. They had not time to die of sepsis! They died of exhaustion because they were left in labour for such a terrible time.

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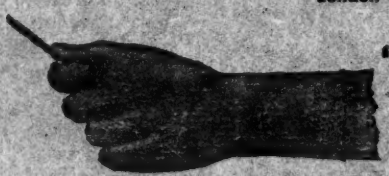

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